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PRINCIPLES

AND

PRACTICE OF SURGERY.

BY

THE LATE

GEO. M'CLELLAN, M. D.

EDITED BY

HIS SON

JOHN H. B. M'CLELLAN, M. D.

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TO

SAMUEL GEORGE MORTON, M. D.,

VICE-PRESIDENT OF THE ACADEMY OF NATURAL SCIENCES, OF PHILADELPHIA, AUTHOR OF "CRANIA AMERICANA," "CRANIA ÆGYPTIACA," "ILLUSTRATIONS OF PULMONARY CONSUMPTION," ETC. ETC.

My dear Morton—

Ever since we were colleagues in one of the medical schools of this city, we have been frequently, indeed almost daily, associated in consultation, for our mutual benefit, in an extensive course of practice. I consider you, therefore, peculiarly qualified to judge of the correctness and applicability of the principles contained in this book; and your approbation of them has given me more satisfaction than that of any of my other friends. For this reason I must be allowed to dedicate this volume to you, as a mark of respect and affection entertained for the professional brother who has done most towards elevating our scientific character among foreign nations.

Your constant friend and fellow-laborer in the cause of Medicine and Surgery,

GEO. M'CLELLAN.

Philadelphia,
May 1, 1847.

EDITOR'S PREFACE.

In presenting this volume to the notice of the profession, the editor feels it due, both to himself and to the work, to state the peculiar circumstances under which it has been brought forth.

Urged and solicited from year to year by many friends and pupils, to give the results of a valuable experience, it was not until a few months before his death that the author was enabled to commence his long promised undertaking. The constant interference of a large practice, prevented him from writing except at uncertain and irregular intervals. Many of the accompanying pages were penned whilst suffering acutely from disease, and relief from pain was often sought by occupying his mind in recording the views contained in the present volume. The work, therefore, necessarily bears the marks of haste and deficiency of arrangement, mentioned by the author in his preface. As if forewarned by some undefinable impulse, that he might not be spared to carry out his entire object, he seemed bent upon hastily finishing what was meant to be the first volume, and its earlier pages were actually passing through the hands of the printer, whilst he was endeavoring to complete it. Suddenly cut off in the midst of these labors, the whole manuscript was left in much confusion, and many of the subjects in its latter part were incomplete. With little clue to his intentions, other than the knowledge of his opinions, derived from some years of daily practice and observation with him, I have endeavored to complete all that was left unfinished, in strict accordance with his peculiar views. Preferring to leave everything as nearly as possible as it

came from his hands, I have not felt myself justified in interfering with the distribution or division of the different subjects.

Owing to these circumstances, and to the confusion attending the author's sudden decease, a large portion of the work has been hurried through the press without receiving the necessary revision, which will account for the large errata that I have appended. To those notes alone which might be thought not altogether connected with the text, I have attached marks to distinguish them as having been inserted by myself. These chiefly refer to important operations performed by the author, which it seemed due to his professional memory, should be mentioned, and which, with many others, I trust at some future period to give more at length. I am not without hope, that with these, and a vivid recollection of his opinions, I shall be enabled to carry out the work to the extent originally contemplated. As now published, the chapters on the different subjects treated of are complete in themselves, and contain most of the important principles of Surgery.

The Author's Preface and Dedication I have given exactly as I found them among his papers.

J. H. B. M'CLELLAN,

248 *Walnut Street.*

March, 1848.

AUTHOR'S PREFACE.

I HAVE always believed and asserted that no inexperienced man ought to be suffered to write a book on Medicine or Surgery. The world is already too full of useless publications, which have been, for almost an age, successively copied from each other. As Horace Walpole, after Lord Bacon himself, is reported to have said in his time, we can now almost wish that another Caliph Omar would arise, and burn up the whole library of compilations and plagiarisms which have been accumulating ever since the grand and blessed fire of bibliopolitan Alexandria. But my present situation before the public is somewhat of an exception to my own rule. I have now arrived at that period of life which I always thought entitled an educated and observing man to be heard; and my old friends and former pupils will give me no further indulgence in the way of resisting these demands. They all claim of me the published reports of my extemporaneous lectures, delivered years ago during successive winters, in the Jefferson and Pennsylvania Colleges of this city. Some of my most attentive hearers have drawn up abstracts for me, and kindly threaten to print a volume of such matter if I do not gratify them by filling up the manuscript blanks with my own corrections and additions, as I can best recollect how they were originally delivered. When I first promised to undertake this publication, I must confess I thought it would be far easier to complete than it has since proved to be. In looking over the manuscript volumes of my best pupils I find they all mistook many important points and connections of ideas, and left too many gaps and

interspaces among the different subjects to enable me to use them with any advantage. I have been obliged, therefore, to shut myself up occasionally from the world, at least for an hour or two at a time, and reproduce my former train of ideas and facts, as I was in the habit of giving them extemporaneously in the lecture room. The constant interruptions, however, which a pressing and busy practice has invariably inflicted upon me, have prevented me from any methodical distribution of the subjects or discussions. One idea has necessarily grown upon the top of another, until I have in this manner rapidly accumulated the outlines of my views and experience on the principles and practice of Surgery. Perhaps my oldest pupils will discover from the introduction of the cell doctrine and some other late novelties, that I have not altogether neglected the progress of science since the period of their studentship. I am persuaded that they will find I have substantially preserved the spirit and character of my old lectures—to which they used to listen with more patience and satisfaction than I ever deserved to be gratified with. Believing that they will all feel disposed to pardon whatever appearances of haste and carelessness they may detect in these pages, I therefore give my manuscript, written literally *currente calamo*, to the printer, without even a revision.

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THE

PRINCIPLES AND PRACTICE

OF

SURGERY.

THE IMMEDIATE EFFECTS OF INJURIES UPON THE SYSTEM.

It would be wrong to deny the importance of inflammation as an object for consideration in surgery. But we may inquire whether it has not been too generally treated of to the exclusion of other almost equally prominent circumstances in the course of our experience. The human body is not a simple mechanism, liable only to one species of derangement. Every individual tissue has its peculiar mode of action; and all the complications of texture present corresponding modifications of disease. The lower orders of the animal creation, like vegetables, appear to be insusceptible of inflammatory processes; while the actions of our economy can certainly go on under the influence of a great variety of disturbing causes, without running into any stage of that disease.

The more immediate effects of injuries, and of all other influences which produce similar results upon the animal fabric, are unquestionably communicated through the medium of the nervous system. The contents of the blood-vessels disturb the actions of life only when they are contaminated by the admission of morbid, or irritating, or poisonous materials; and then it is a question whether the results are not dependent on a final impression upon some portion of the cerebral or spinal apparatus. The vessels are everywhere, in a great degree, subordinate to the nerves; and it is hardly

possible to conceive of their independent condition when in a state of disease.

If inflammation is to be regarded as a peculiar and morbid condition of the blood-vessels, we must, therefore, advert to a variety of phenomena which usually precede it in the order of development after the action of injurious causes.

The first result of a local injury upon the living parts, is a more or less appreciable disturbance of their functions in an outward, or, if we may use the expression, in a centrifugal direction from the nervous centres. This will be understood by a reference to the mode in which we excite contractions in a muscle by irritating the distal extremity of its appropriate nerve, after its division in our experiments upon animals. The vital actions and functions of the parts in, and sometimes beyond the injury, are in this way affected without any communication with the sensorium. Paralyzed limbs, even after entire interception of spinal influence, are often excited into diseased actions. Many patients are not made aware of an injury by any feeling of its consequences on the system. Local inconveniences in the same way occur without any suffering of the constitution.

But it more frequently happens that the direct as well as ultimate impression of an injury is propagated towards the great nervous centres. Whenever a painful sensation is experienced, the nervous current must have been centripetal—for a divided sentient filament can never be irritated by an impression on its remote extremity. Every pain felt in the injured part must be the result of a reflexion from the sensorium through the affected nervous filaments; and the sympathetic distant sensations, as well as muscular spasms, which are so often experienced after wounds, can only be referred to the reflex actions of the spinal cord.

Wherever there are commissures connecting the different fasciculi of nervous fibres within the spine or calvarium with each other, reflex actions may be propagated; and as these commissures extend in various directions so as to connect very remote filaments, it is impossible to conceive how many distant and dissimilar parts may not be associated in their sympathies. It is from a comprehension of these points in minute anatomy and physiology alone, that a rational estimate can ever be made of the important subjects of local and constitutional irritation.

The immediate impression of an injury upon the nervous system

is very appropriately denominated by the term *shock*, which may be either partial or universal. A limb which has been struck by any kind of sudden force, may be rendered torpid and continue so for a considerable period, while the whole constitution is never affected. The muscular powers are sometimes disabled from blows, while the sensitive remain natural; and, *vice versa*, the sensations may be impaired during the integrity of every other function. This is especially the case with the eyeball, the two orders of sensibility in which (viz., the common and special), and the muscular movements may each be separately affected from the others, after the reception of blows and wounds about the orbit.

Shocks are, however, generally propagated more extensively throughout the system, and become the evidences of what the old surgeons used to call constitutional alarm. In very severe cases the same effects are produced as occur in concussions of the brain. After terrible falls and injuries upon the trunk or extremities, the abolition of sense and motion and of circulating power, is as complete as when the force is directly communicated to the head. It must not be supposed, however, that such cases are always the result of cerebral injury. The passage of heavy bodies, like large timbers or millstones, across the lower extremities, has produced the same condition of things, although no suspicion of a concussion of the brain could have been entertained. The nervous ramifications throughout a large portion of the extremities or trunk, may, indeed, be similarly disturbed by the influence of a jar or concussion, directly imparted to them by the shock of the injuring cause, and extended, through the medium of continuous sympathy, to the whole of the cerebro-spinal system.

But this extension of the force of a shock is distributed in a great diversity of modes as well as intensity in different cases. The circulating or respiratory organs will be most deranged in one case, the cerebral in another, and the digestive or urinary in a third. In the less intense forms there is nothing but a paleness or languor, and universal sense of coldness, sometimes attended with tremors and fright, and hurried respiration. In a severer grade there will be a small, intermitting or tremulous pulse, irregular or sighing respiration, shivering or rigors, with imperfect apprehension and incoherency of mind, vomiting and convulsions frequently supervening. In a still graver form, the patient will be either delirious or comatose,

with involuntary discharges and a cold clammy sweat;* and in the highest grades, such as have been termed overwhelming shocks, he will present the appearance of extreme and protracted syncope.

In cases of *overwhelming shocks*, which have been attended with considerable hemorrhage, recovery becomes very improbable. It is always proper, however, to resort to active stimulation by all the means which are accessible under such circumstances. As deglutition cannot be performed in desperate cases, we must depend on frictions with warm irritants, on ammoniacal sternutatories, and enemas of brandied gruels or broths into the rectum. By maintaining the head and shoulders a little below the horizontal line of the body, we can sometimes rouse the nervous influence by favoring the access of blood to the brain. All the hemorrhage should of course be checked by the most prompt and efficient measures, followed by appropriate dressings and topical remedies for the wound. As soon as the power of deglutition has been restored, small doses of brandy, in the form of toddy or gruel, should be given, and sometimes the addition of a few drops of aromatic spirits of hartshorne will prove very beneficial. But over-stimulation should be guarded against, for it is possible to oppress the sunken powers instead of exciting them by too active treatment. If the system still possesses any recuperative energies, very moderate stimuli to each avenue of administration will prove the most salutary.

Fortunately, however, for the interests of humanity, it generally

* It is a singular fact that more patients recover after reaction from a complete and overwhelming concussion of the whole nervous system immediately following an injury, than after some of the apparently more moderate forms of shock. When the syncope is not complete, the mind being conscious of impressions, although torpid and incoherent, and the pulse hurried and tremulous, with the respiration sighing, and the discharges involuntary, after a terrible injury, the forces are almost sure to run down in a very short time, without any subsequent effort at reaction. In some such cases the symptoms of disturbance are so slight at first as hardly to be appreciated, and as the forces are afterwards worn down by the actions consuming the excitability, a final condition of prostration supervenes, which has been called secondary shock. I once saw a poor fellow, whose leg was crushed on one side up to the knee, and on the other up to the trochanter, and one arm also up to the middle of the humerus, by the wheels of a rail-road train. He lost but very little blood, and did not sink into complete syncope for almost an hour after the occurrence, of which he died in about another hour. In the meantime he was possessed of mind enough to tell me of his birth-place in Germany, his friends and his property, and to express his wishes about messages to be sent to his home.

happens that constitutional shocks are temporary in their duration; and if reaction has not been forced by too active or too long continued stimuli, the efforts at restoration are made equably and uniformly throughout the system. A healthy, although, perhaps, an enfeebled condition is then established, and the subsequent actions for reparation of the injury are allowed to progress favorably.

INSIDIOUS SHOCK.

In some very severe cases of injury a peculiar kind of shock is given to the nervous system, which is too little known by our profession. The patient may be somewhat agitated and confused at first, but presently complains of little or nothing. He suffers no pain or inconvenience of any kind, and is hardly willing to have the attention of a surgeon directed to his wound. The pulse and respiration remain undisturbed; and the by-standers apprehend no danger from the appearances. Inexperienced medical attendants take no alarm, and perhaps every one prognosticates favorably. But the case looks altogether too well for one of such magnitude. A great joint has been torn open, a terrible compound fracture is present, or several of the large muscles and nerves have been lacerated, and yet no corresponding disturbance is manifested.* The skin continues cool and transpiring; the tongue clean; and the secretions natural. Such cases may be compared to those which occur in the outbreak of a yellow fever and other malignant epidemics. Patients will then be seen walking about, and perhaps attending to their regular duties, until the very moment when they drop down and die. During the epidemic typhus, or spotted fever of New England, the people fell down at the plough-tail, at the spinning-wheel, and the grist-mill. In one of our earlier yellow fever ravages, Dr. Rush met a friend walking the streets, with death depicted on his countenance, and had only time to accompany him home, and see him expire. During the cholera of 1832, a carpenter, who was carrying his tools to a workshop, was caught up by the police officers, because they saw the livid hue of his asphyxiated face, and dragged struggling to the nearest hospital, where he died, protesting that he would go back to his work.

* As Hunter observed—"*Nature requires to feel the injury.*"

These may well be denominated cases of *insidious* shock. The symptoms are deceitful enough. Perhaps from the very suddenness and intensity of invasion, the springs of nervous energy are cut off —the foundations of life are undermined, and no further elaboration of the great principle of innervation can be effected. The actions of the system are allowed to go on with apparent tranquillity, until they wear down or exhaust all the power that has been stored up, and the forces sink into annihilation. Such patients may be compared to the condition of a ship whose rudder has been lost, or whose cable has parted, and a treacherous current is wafting her on rapidly but quietly to the engulfing maelstrom. The passengers stand loitering about the deck, unsuspecting their doom, till suddenly they find themselves going down into the whirlpool.*

The only symptom in addition to the above detail of circumstances upon which an intelligent surgeon can depend in the diagnosis of

* One of the most striking cases of this kind of shock I ever knew, occurred about twenty years ago, in the person of Mrs. S., the very beautiful and delicate wife of a Portuguese merchant then resident in this city. She had been upset in a buggy from a too rapid turning of the horse, and on attempting to leap out at the instant of the overset, she produced a bad compound dislocation of her right ankle inward, and a comminuted fracture of the lower portion of the fibula. Her family physician, the late excellent Dr. Harvey Klapp, was so struck with the condition of her system, that he had me called into consultation on the third day. I found her perfectly free from pain and febrile action, with a soft and tranquil pulse, and natural respiration. Her tongue was clean but quivering, and the intestinal, urinary, and cutaneous secretions had gone on very well. But the wound had neither adhered nor inflamed. The parts had become slightly pulpy, and discharged a thin sanies, without any attending inflammation or disagreeable odor. Her skin, however, presented an orange hue, and her countenance expressed great fright or alarm, although her mind was perfectly composed. The points which I have aimed at in the text were exactly marked in her face. She was composed and smiling about the lips, but suspicious and threatening about the eyes and forehead. Every time I came up to her bed-side, she would stare at me with corrugated brows and wrinkled forehead, with an expression of apprehension and astonishment or surprise. I of course gave an unfavorable prognosis, and although every attempt was made to sustain her by moderate stimuli and cordials, she rapidly declined into irretrievable exhaustion. The next day I found her respiration hurried and irregular, her countenance more anxious, although she was still destitute of fever and delirium. The ensuing night, however, she became flighty; her heart palpitated and fluttered; she fell into twitchings or convulsions, and died before the occurrence of mortification, or even of decided inflammation. Several other such cases have since happened under my observation, after severe gun-shot wounds and violent injuries of the joints. They all proved fatal in the same way.

this kind of shock, is a semeiological one. The countenance of the patient is altogether unnatural. It presents an inquiring, anxious look about the forehead, eyes, and upper portions of the face, while all about the mouth and lips is smiling and composed. It resembles the mixed sad and cheerful expression which our great novelist, Dr. Bird, has attributed to Montezuma in his captivity, and by which some authors have attempted to characterize the whole of our aboriginal race—a melancholy smile about the lips, indicative of their fatal proclivity to destruction. There is another circumstance about the expression of the countenance, which will strike an intelligent observer. When you first approach the bed-side, the patient will look up at you with a stare of alarm and suspicion; and he will repeat this expression constantly as often as you approach him to make any inquiry. No matter how long you remain in the room, whenever you attract his attention, his forehead will be drawn up, and his brows contracted into a scowl of suspicion, mingled with anxiety.

If these patients do not always die, certainly every practitioner should be cautious in giving a favorable prognosis. The probability is, that not more than one in a hundred can possibly recover; and we may put down this as the most dangerous kind of shock.*

REACTIONS.

In vigorous habits, a shower or cold plunging bath is followed by an immediate glow over the whole surface, and an increase of excitement throughout the system. A similar reaction often supervenes after injuries in the same kind of constitutions; and then no appreciable state of depression from the shock can be made out. The consequences are generally favorable in such cases; for the excitement is temporary and uniformly distributed. But after an interval of prostration from a shock, and especially when any tissue or organ has been predisposed to disease from previous morbid or de-

* It must not be supposed that every case of injury which is unnoticed by the patient will present an instance of this kind of shock. Many deep and serious wounds occur without producing any appreciable kind of disturbance to the nervous system. Brave and cool persons, of firm stamina and sound in constitution, may be deprived of a limb by the force of a cannon ball, without any misgiving of nerve, or distress of mind.

bilitating influences, injurious results are apt to follow the reaction. The sudden increase of excitement throws the blood, and perhaps the principle of innervation, too severely upon the debilitated parts. Vascular engorgement, vital, or functional disturbance, irritation, and finally inflammation, may all successively arise from this cause.

There is another circumstance which should be adverted to in our speculations upon this point. During the stage of torpor or depression from a shock, the power of being acted on by stimulants (the excitability of Brown) is increased often to a morbid degree; so that the influence even of the natural stimuli of life becomes subsequently the cause of diseased excitement. This latter condition, indeed, constitutes the very essence of local irritation, and also of morbid irritability, which latter condition becomes the foundation of what modern surgeons have so much dreaded under the name of constitutional irritation.

In our management of cases of reaction, it is obvious that care should be taken not to allow the procedure to run too high, or continue for too long a period. Direct depletion, however, can rarely be necessary, except in very full habits, and during very violent excitement. There is always some risk of sudden depletion being followed by a repetition of the prostration, or with what we shall subsequently have occasion to notice under the head of irritative excitement dependent on loss of power to sustain itself. In general, sponging with cool water, fresh air, and a moderate elevation of the head, will sufficiently subdue the excitement following reactions of every kind.

Although we do not often meet with London porter or strong beer drinkers in this country, still we have a large proportion of meat eaters, who consume heavy meals three times a day, and promote their digestion with condiments and alcoholic stimuli. Such persons on being struck down with severe injuries, are sure to be affected with plethora and high vascular excitement. The sudden deprivation of their accustomed exercise out of doors creates an accumulation of excitability which is very apt to be mistaken for inflammatory or febrile action; and, as a natural consequence, severe depletion is resorted to. In the same way hard drinkers are liable to deceive practitioners by a false appearance of inflammatory reaction. But real inflammation has not yet, perhaps, occurred. Nothing but tumultuous or plethoric excitement, which will yield to moderate measures, has yet supervened.

A simple emetic of ipecacuanha, or of strong salt water, or mustard, will speedily relieve the symptoms, not merely by unloading the stomach, but also by wearing down and equalizing the excitement. This is a very important matter, especially when the accident has occurred just after meal time; for the shock of an injury is sure to suspend the process of digestion.* Nothing can be more injurious than to leave undigested crudities upon the stomach under such circumstances. They will create oppression and prevent the salutary reactions, as well as the beneficial influence of remedies.† Afterwards mild purgatives, with diluent drinks, and evaporating lotions to the surface, will prove sufficient to moderate the excitement, while blood-letting will rarely be necessary, and then only in moderate quantities. There can be no greater mistake than to resort to severe depletion, under the idea of preventing inflammation. Such a course will render the system irritable, as well as feeble, and be sure to increase the evil of the very circumstance which it is intended to prevent. The slightest punctures and scratches in habits debilitated by repeated losses of blood and starvation, as in the irritable sympathizing temperament of Hunter, have often produced the most malignant and destructive inflammatory processes. In habitual drinkers, it is almost always necessary to resort to direct and constant stimulation after such evacuants as have already been suggested.

IRRITATION.

After reaction from shocks, and even where no previous shock has been experienced, various forms of disturbance in some one or more of the functions of life occasionally arise. To these the term irritation has been applied by surgeons, and it has been qualified as local or constitutional, according to its greater or less extension throughout the economy. When all the functions of the body are

* It often propitiously happens that the first effort at reaction, after a severe shock, is made by the stomach in an effort at vomiting. All we then have to do, is to encourage this effort by forcing down draughts of warm water or chamomile tea, and the attendant rigors, like the shiverings of a chill in an intermittent paroxysm, will immediately be followed by a salutary glow and perfect recovery.

† Hysteria is sometimes rendered fatal by crowding the stomach with powerful stimuli and cordials, while that organ is oppressed by undigested crudities and foul secretions.

deranged in consequence of a general irritability of the whole system, the condition is well denominated constitutional irritation.

But we will first speak of the local or partial manifestations of this disorder.*

The reflex actions of the nerves, by which it is alone possible to account for the various sympathies of the body, are capable of transmitting all kinds of impressions, as well as shocks, to remote organs. It cannot be difficult, therefore, to conceive how the effects of an injury, or any other disease, may influence the vital properties of any important organ, by virtue of this connection, so as to derange its functions, and thereby constitute a local irritation in that part. The brain, the lungs, the heart and arteries, the stomach and intestines, the bladder, the male and female organs of generation, the glands (salivary, hepatic and renal), the muscular and unsymmetrical nerves, may each alone, or in complication with each other, be in this way affected, when but very little difference in the location or violence of the injuries can be discovered.†

* The abstract term irritability has been used in different senses by medical writers, and we should take care not to confound them in our disquisitions. In a physiological sense, it is applied to the great vital property which every organized tissue presents during life, i. e., the capacity of being excited by the action of its appropriate stimulus. This general property presents various modifications, to designate which other abstract terms are also applied, e. g., sensibility to one class of nerves, and this is again subdivided into special and common. The term contractility is applied to the muscles and their excitory nerves as far as the influence of resolution is concerned. The power which these organs have of being thrown into action by all other agents or irritability, is denoted by the use of the word irritability again in a special sense. It is to be regretted that the more generic term *excitability*, so happily employed by Brown for all these conditions of life, had not been used by the whole profession for physiological purposes at least. In a pathological sense, the term irritability is used to designate that altered state or morbid condition of the several parts, which causes even the natural stimuli to produce deranged instead of healthy actions. Thus the eye is said to be irritable when the light produces pain and lachrymation; the ear when noises become distressing; and the stomach when the food is rejected directly after it has been taken. Every organ and tissue in the body is liable in this way to become irritable, and may, therefore, properly be said to be in a state of morbid irritability. Proper care should also be taken by the student to distinguish between the terms irritability and irritation. The first means the faculty or power of being irritated; and the second, the function or performance of that faculty when in action.

† Some limitation must be made to this general proposition, as in case of the uterus and mammæ—the bladder and rectum—throat and skin—the urethra

It is generally believed by the profession that irritation consists, in all these cases, in a mere derangement of the principle of innervation, totally unaccompanied by vascular excitement. It must be conceded, however, that the ingress of blood into the vessels of a morbidly irritable part, is one of the means of rousing this irritability into action. The natural excitability being altered as well as increased after the reaction from an injury, all the ordinary excitants, even of health, become productive of diseased actions. Thus heat and exercise, and the interstitial circulation of the fluids, become injurious when allowed to act above a certain degree. The contents of the large vessels, and the fluid and solid nutriments of health, also become injurious to the organs which contain them. By keeping down the influence of all these agents below a certain degree, we can assist very much in moderating the irritation in some cases; while in others, by allowing them to rise to a certain point, and even by maintaining them by invigorating measures, we relieve the symptoms according as we consume or wear down the accumulated principle of excitability to its healthy standard.

Irritation occurs before the access of inflammation, and may continue for a long period totally uncomplicated with it. If vascular turgescence, however, be allowed to arise in the same part, and continue there, that morbid condition of the blood-vessels which is termed inflammation will certainly be developed. The irritation does not terminate at the access of inflammation following under such circumstances; but the degree in which it is complicated with the inflammation, modifies the character and violence of the latter disease accordingly.

The phenomena of pure irritation are modified in the different tissues and organs in correspondence with all the peculiarities of their organization and functions. In parts where nothing but simple vital actions are performed, such as tendons and cartilages, it is thought by some not to exist. It will be difficult for them to conceive, however, in what manner inflammation can occur in those tissues, without a previous derangement of their natural irritability. The simplicity of their organization, and their low degree of vitality, prevent them from manifesting any high degree of action either in health or disease.

and testis, &c.,—where there are more direct and frequent sympathies than between other organs. Such parts experience the effects of a shock more easily than others by virtue of the *consensus partium*.

In complicated parts or organs where those general actions of life which are called functions are performed, irritation is manifested by a derangement of those functions. Thus, in the brain, according to the parts of its complicated organism which are affected, it disturbs the faculties of the mind, or the sentiments, or propensities; in the eye, vision; in the ear, hearing; in the stomach, the function of digestion, &c.

IRRITATION IN THE BRAIN.

In regard to irritation in the brain, it is properly asserted that the manifestations partake of the character of the trembling delirium which occurs in the persons of inebriates. It has recently been more particularly described under the head of traumatic delirium; and nervous apprehension, morbid vigilance, agitation and tremors, are its most common traits. But from the points just alluded to in regard to the diversity of organs in the brain, it must be inferred that a great variety of symptoms prevails in different cases. Some patients will always crave to go home immediately after their recovery from a shock, no matter where they may be located, and an incessant expression of this desire will continue for hours. Others will contract a sudden aversion for kindred or friends who are present, and will retreat from them with horror, or quarrel without any provocation. Some will pray and beg for divine aid, others will despond and complain of everything that occurs, while a few rare cases will be full of merriment and laughter. A low or moderate form of delirium will occur in some instances, marked by disordered apprehension and incoherency, a raging and violent insanity in others, attended with desperate struggling, and attempts at destruction. When such cases are unattended with the symptoms of febrile excitement, there can be no difficulty in making out the proper diagnosis; nor in deciding upon the propriety of immediately resorting to composing doses of opiates, either administered by the mouth or rectum. But often there is an unfortunate complication of the delirium with a hot skin, quick and frequent pulse, suppression of the secretions, and other symptoms of constitutional disturbance. In fact, under these circumstances, the case rises into one of the worst forms of constitutional irritation. It then becomes very difficult on the part of inexperienced practitioners to discriminate

between this disease and generic inflammation of the brain, and of the attendant inflammatory fever. Intemperate persons, and those who have been enfeebled by sedentary occupations in ill-ventilated apartments, are very liable to this condition. Also exhaustion from large and repeated hemorrhages, and, in fact, exposure to any causes which can superinduce high action upon a weakened constitution, will produce the same state. It was originally characterized by John Hunter as action without the power to sustain itself; the vessels, in his view, making stronger efforts than they had strength to endure. Later authors have called it irritative or asthenic excitement, in contradistinction to inflammatory fever. Some have preferred to characterize it as "*prostration with excitement.*" They might as well have denominated it *excitement tending to prostration.*

As this condition of system occurs in connection with other local irritations than those of the brain, and is, in fact, one of the most dangerous as well as mismanaged forms of disease, great attention should be paid to its detection. As has already been hinted in speaking of the treatment of shocks, if stimuli be resorted to unnecessarily, or pushed too severely, the actions will be excited to an apparently more inflammatory effort, but the fever will certainly prove irritative in its character, and cannot terminate in resolution, or any reparatory result. On the other hand, improper depletion, instead of reducing the excitement, will inevitably lead, perhaps after a temporary mitigation, to a renewed exasperation and increase of the general as well as local irritation.

That excellent surgeon, Sir B. Travers, makes a distinction between direct and reflected irritation—the former of which, being the direct result of a wound upon a good constitution, may, perhaps, better bear depletory treatment; and the latter, occurring from the reflected disturbances in a morbid or previously deranged habit, is thought to require, invariably, remedies of an opposite character. Whatever may be the justice of this practical distinction in the crowded cities of Europe, in this country, certainly, the most severe forms of reflected irritation become proper subjects for depletory treatment. Phlegmonous erysipelas and anthrax, which Mr. Travers specifies as presenting the most severe forms of reflected constitutional irritation, are here treated, in the early stages at least, by the most decisive depletion. The powers of the system are oppressed in many such cases, instead of being debilitated. They rise under depletion like an overloaded pack horse, after his burden has been

removed, and are afterwards enabled to develop a fair type of inflammatory fever.

As to the method of discrimination between the two opposite states of irritative excitement, and mere inflammatory fever, much need not be said in addition to what has already been pointed out. In general, we observe more agitation and restlessness of all the actions in the former. There is much less stability and regularity in the progress of the disease; and everything appears to indicate an undetermined or indefinite mode of excitement. The breathing is hurried and irregular; the skin is either alternately hot and cool, or its temperature is very unequally manifested on the different parts of the body. The perspiration is also very irregular in its extension over the surface and in its periods; and even when thrown out in excess, does not moderate the vascular excitement. The pulse is rarely, if ever, steady in its action. It is generally very quick and frequent, often amounting to 120 or 160 a minute; and presenting a jerk or a thrill to the finger of the surgeon. It is frequently small and thready, and sometimes large, and, to the feel, empty of blood between the beats. There is always more anxiety than in fever, and more alarm and agitation of manner, even when the patient is free from delirium. There is a greater degree of morbid vigilance and susceptibility to impressions of every kind; and, of course, a more rapid exhaustion of the vital powers. The forces run down much more rapidly, and the patient, in a hopeless case, will often die before mortification of the wounded part has had time to occur.

Some authors have been very kind in affording one general and positive direction as to the treatment of cases of all kinds of irritation. They say, the first thing is to remove the cause; and it would be well if we could always follow their advice. An offending tooth, indeed, or a splinter of bone or wood, or a bullet may be extracted, and thus we speedily put an end to all trouble in many cases. But, unfortunately, the causes are, generally in bad cases, incapable of removal. In severe injuries of the extremities, we always endeavor to save, instead of amputating the limb; and we therefore palliate by soothing dressings and topical remedies, instead of removing the exciting cause. A variety of disturbing influences, however, may coexist in the same individual, and all of them may require correction, if not removal. We have already spoken of the importance of relieving the stomach by emetics, in some instances; and it is equally necessary to recollect that one of the first steps in the treat-

ment of every case, is to procure proper evacuations from the bowels. But the mere evacuation of them is nothing in comparison with the subsequent character of their secretions. In most cases which progress unfavorably, the discharges soon become fluid, like a dirty or muddy water, and all signs of feces or hepatic secretions disappear. The small intestines also become greatly distended, and speedily afterwards tympanitic, which condition indicates great loss of tone in their muscular coat, as well as irritation of the mucous membrane. This very state generally becomes the cause of prostration in our remitting fevers, when they begin to assume a typhoid form; and always presents an unfortunate complication in every other disease. The Germans have called it *meteorismus*, and the practitioners of every country have found it to be exasperated, if not produced by harsh and drastic purgatives. Saline cathartics are especially injurious; and, indeed, everything in the shape of hydragogues. A combination of mercurial alteratives, with opiates, or other soothing anodynes, fulfils the proper indication. The blue mass, with hyoscyamus and camphor, or calomel and opium, are generally prescribed with us. Sometimes small doses of kreosote or turpentine given in emulsions, will relieve the abdominal distension and assist the mercurials in restoring the intestinal secretions.

IRRITATION OF THE URINARY ORGANS.

The condition of the urinary bladder will especially require attention in many cases. When severe shocks have been experienced, this viscus is sometimes thrown into a temporary state of paralysis, and provided the secretion of urine goes on, a speedy over-distension and consequent protraction of the paralysis results. It has thus happened, that a secondary cause of irritation or oppression has been allowed to operate, and the patient has sunk under irritative excitement and finally coma, before the importance of catheterism could be demonstrated. But the opposite state of suppression of the urine more often interferes with the success of our treatment. Either the original shock has been communicated to the kidneys and paralyzed them, or the ensuing irritation has reached them and excited over-contraction of their capillary vessels, and thereby checked all secretion of urine.

These conditions of the bladder are by no means uncommon after

severe injuries and operations; and every judicious surgeon will inquire carefully into the possibility of their existence. He must not depend, however, upon the statements of a nurse or mere bystander in reply to this inquiry. If the general tumefaction of the abdomen prevents him from satisfactorily distinguishing the condition of the fundus of the bladder, he makes an examination through the rectum, or by means of a catheter carried up the urethra.

As soon as we are satisfied that suppression of urine exists—and a proper examination between twelve and eighteen hours after the injury will always determine this point—the most anxious efforts should be made to restore the natural secretion. Full doses of spirits of nitre, or Hoffman's anodyne, in combination with turpentine and infusions of the diuretic herbs are generally administered. The compound powders of calomel, digitalis and nitre, or large doses of calomel and camphor are very efficacious remedies: —also, repeated stupes and fomentations around the trunk and pelvis, and counter-irritants acting upon the lumbar region. We should always persevere in our efforts to restore this secretion, notwithstanding the opinion of most old practitioners, that the suppression of it is fatal. Recent experience has proved that it may be reinstated after a total suspension for six days from the time of an injury with a consequent subsidence of all irritative excitement.

IRRITATION OF THE STOMACH.

The stomach, from its strong sympathies with so many parts, becomes more frequently the seat of irritation. Long after its contents appear to have been evacuated, a distressing nausea will sometimes supervene, and ineffectual efforts at retching; and these will occasionally be combined with a deep and obstinate hiccuping. After a long continuance these become most alarming symptoms, especially when accompanied with sinking or with irritations in other vital organs. In moderate cases it will generally prove easy to afford relief by the application of a sinapism over the stomach, and the internal use of small doses of morphium or aromatic spirits of ammonia. Active enemata, at first cathartic, and afterwards opiate, often prove very useful as auxiliaries; also, calomel pills in combination with opium. Great care, however, should be taken to interdict every kind of drink, except in small quantities and at long

intervals apart. It is better to give only a teaspoonful of cold water or camphor water with each dose of the composing remedies. But in some rare cases, it will be found that the protraction of the retching is owing to a paralysis of the muscles of the stomach; so that all the expulsory efforts come from the spasmodic contraction of the diaphragm. If there be any actual vomiting, then it will be performed with a singultus-like effort, and the contents will be thrown up, or spurted out at a distance with a jerk. Now in these cases, there is very probably a quantity of undigested matters still remaining on the stomach, which the proper muscles of the organ are not able to dislodge without the aid of large and repeated draughts of warm infusions and aromatic stimulants. By an occasional change of the position of the patient, and even by holding his trunk above the level of the head and shoulders, during the efforts at vomiting, we can sometimes favor the expulsion of the offending substances, and afterwards quiet the irritation by ordinary measures. At all events counter-irritation down the spine, by means of hot water or burning cotton, will then be likely to overcome this distressing irritation of the great vital centre. The pure and uncomplicated singultus, however, which occurs at a later period, especially if it be deep, loud and unremitting, proves invariably fatal. An absolute exhaustion of all nervous energy has then occurred, which no stimulation, however active, can ever arouse.

IRRITATION OF THE LIVER.

It is notorious that the hepatic secretions often become affected by injuries. In wounds of the head, it was long ago ascertained, that even abscesses might be formed in the liver under the influence of sympathetic irritation. An excessive secretion indicated by vomiting and purging of bile, sometimes follows injuries; but more frequently a jaundiced hue of the eyes and skin denotes a latent disturbance in the liver. Perhaps the total disappearance of bile in the evacuations from the bowels, indicates the severest form of this irritation. The moment such symptoms are observed, the appropriate counteracting measures should be resorted to. Cupping, or leeching over the right hypochondrium in all plethoric cases; and blisters or other counter-irritants in prostrate conditions, are the first remedies. Next follow purgatives, and repeated doses of

mercurials in combination with such opiates, or other adjuvants as the constitution may require. Sometimes a dilution of the nitro-muriatic acid will prove the appropriate remedy, either internally administered or applied externally in the form of a wash.

IRRITATION OF THE HEART.

Notwithstanding the independent condition of the heart in regard to the powers of volition, it is very subject to the influence of the reflex actions of the nervous system. Although the spinal nerves do not readily propagate such an influence to it under ordinary excitement, we have abundant proof that impressions conveyed through them by the force of injuries, can disturb the functions of all organs supplied by the sympathetic or unsymmetrical system; we often see the languid powers of the heart, as well as those of the diaphragm, roused through this connection by pungent odors to the nostrils, and stimulating applications to the skin. There can be no difficulty, therefore, in anticipating that the great centre of circulation should be embarrassed by irritation from the effects of injuries. After faltering for a while, or fluttering during its efforts at reaction, it is very apt to become irritable in feeble temperaments, and beat with violent palpitations or inordinate quickness. Even in the strongest patients it generally becomes more rapid than natural in consequence of its increased excitability, and that too independently of any febrile condition. In phlegmatic habits, it sometimes becomes very slow and intermitting. It is uncommon to witness the development of sensibility in this organ under reaction from injuries; but in hysterical patients, this cause may excite distressing sensations, or even acute pain, as well as palpitations, in the substance of the heart. In aged persons, who are liable to structural diseases in this organ, it is not uncommon to meet with pains in the region of the heart, and intermissions of the pulse;—but when these symptoms occur in the young and robust, they are in general thought to indicate an unfavorable result. Such patients do certainly, however, recover when they are not afflicted with dangerous irritations in other parts. When the intermitting pulse occurs periodically at certain hours of the day, manifesting the characters of a miasmatic influence, there is very little to be feared even if pains in the heart accompany this irregularity. The sul-

phate of quinine, and other forms of bark have repeatedly overcome this symptom, even after the approach of gangrene in compound fractures and dislocations.

The function of respiration is so intimately connected with that of the circulation, that any disturbance of one must almost necessarily influence the other. Whenever the actions of the heart are very much excited in constitutional irritation, it always happens that the respirations are increased in violence. If the pulse is only moderately accelerated, and not greatly deficient in force, the respirations being at the same time full, and not increased to more than double the healthy number in the minute, and especially if the skin be hot and the secretions arrested, there can be no doubt of the propriety of resorting to the antiphlogistic method of treatment. When the action of the heart and pulse is oppressed, and the respiration at the same time laboring, there is little doubt that prompt depletion by general and local means will be proper. Even if the skin is cold, and the complexion inclined to lividity, free cupping around the chest, followed by the severest counter-irritation, will be necessary. There is in such cases great danger of congestion in the internal organs and capillaries, and of a consequent fatal oppression of all the vital functions. But in cases where the actions become weak and tremulous, with a very rapid and quick pulse, no matter whether its volume be small or large, and the respirations are at the same time short, hurried and anxious, depletion should always be avoided. Aromatic cordials and stimuli must then be administered; and all sources of sympathetic derangement in other parts, if possible, rectified. A great difference, however, will be observed in the results between cases of mere disturbance in the mechanical respiration, and those of impairment of the physiological function. The great principle of innervation being perverted, no matter whether its supply be intercepted through the medium of the pneumogastric or the sympathetic nerves, all appearances of arterialization in the blood soon begin to fade,—the complexion becomes bronzed or livid, the lips and tongue cold and dusky, and dangerous engorgement of the bronchial tubes soon supervene. The carbonate of ammonia, in full doses, with phosphoric ether, and brandy, aided by severe counter-irritation down the spine and around the thorax, with the occasional transmission of the electric fluid, by means of galvanic wires from the region of the neck to the epigastrium, are the only means of relieving such a condition. Perhaps the temporary respiration of pure oxygen gas might con-

tribute greatly to the same result; but few practitioners are so interested as to be able to command such an appliance.

IRRITATION IN THE NERVES.

Although a very specious hypothesis* has been advanced to explain the mode of local inflammation, from slight injuries, it can hardly be carried out satisfactorily to the general phenomena of nervous disturbance. It is that local irritants excite the sensory nerves, and paralyze all the muscular filaments which are connected with them by central commissures, or to allow of the propagation of reflex actions back to the same part. This is carrying out the reflex doctrine to a very refined extent; and the author who first suggested it, was very fortunate in being able to explain to the satisfaction of many teachers, the pathology of inflammation. The pain in every inflamed part, arises from a direct injury to its sensorial nerves, and the swelling and redness from an enlargement of its vessels, produced by a paralysis of their muscular nervous filaments! But while we may be indisposed to question one of the highest authorities, upon the subject of inflammation, we may be allowed to inquire how the muscular nerves are affected, in general, after injuries. They may be paralyzed in some instances, as we have already stated under the head of shocks, from a great and sudden diminution of nervous influence; and this paralysis may be either partial or general, according as one or more of the muscular apparatus of nerves is deranged. But it is very questionable whether irritation can ever be said to produce the paralysis of a muscle.† On the contrary, spasmodic contractions are involuntarily excited in various ways, according to the character of the irritation, and throughout a greater or less extent of parts, according to the number of sympathetic relations between them. Sometimes the spasms are intermittent, occuring in paroxysms, with omissions or intervals; or they are continued, maintaining the affected fibers for a long time in a state of unnatural rigidity. These spasms, when they are short

* Henle's doctrine of nervous antagonism has been advocated by Wharton Jones, and others of great authority in the profession.

† Probably Sir Charles Bell's original suggestion, that an exaltation of the fourth pair of nerves relaxed or paralyzed the superior obliquus of the eye-ball, gave origin to this idea.

and sudden, and attended with pain, are generally called cramps. When they are general, or extended throughout the whole system, they are denominated convulsions. The simple term spasm, is usually applied to partial involuntary contractions, which are unaccompanied by pains. If pains co-exist with spasms, the epithet painful is prefixed as a qualifier. Very slight and momentary spasms of the muscles of the face are called twitches; those of most other parts, tremors or quiverings; and those of the flexors of the hands and feet *subsultus tendinum.* Although the word *tetanus* belongs to the same category of terms, and designates a condition of painful spasms of the muscular system, still the pathology which it involves is of much higher moment, and must be considered more at length under a separate head.

It has always been a favorite opinion with our profession, that the irritation which produces spasm of any kind, must be founded on debility. Cullen entertained this notion, when he elaborated his admired hypothesis, or rather exegesis, of the phenomena of fever. The shrinking of the capillaries in the chilly stage, was regarded by him as a spasm of their muscular coat, and this he attributed to the preceding sensations of debility complained of by the patient. But he never thought of inquiring whether the vessels themselves were enfeebled. Debility is a very indefinite term when applied to so complicated a machine as the human system, especially when in a state of disease. One part may be very weak, and another perfectly strong. The external manifestations of animal life may be very languid, while the powers of the vital organs, and the organic actions of the very muscles themselves, may be over-exalted and vigorously perform motions of a destructive tendency. The voluntary contractions of the muscles may be very feebly executed, or even totally paralyzed, while the galvanic fluid can excite in them forcible involuntary contractions. Irritating the foot of a paraplegic patient, will often throw his palsied muscles into strong jerks, or spasms, when he is as destitute of volition as of consciousness over the parts. How often do we see the most delicate females, in a hysterical convulsion, exerting prodigious efforts of involuntary strength, when, in a state of composure and consciousness, they could hardly lift a feather.

But it is unnecessary to enter upon an extended disquisition on this subject—spasms may occur in strong as in weak muscles—in vigorous and plethoric as well as in weak and emaciated persons,

and in many respects be involved with the same considerations as pain. Pain, indeed, has been pronounced to be a spasm of a sensitive part. It is the evidence of an irritation in one of the nerves of common sensibility; while spasm is indicative of a similar irritation in one of the muscular nerves of the spine. Irritations of the nerves of special sense do not produce pain of any kind ; they simply derange the functions of those nerves.

In the organic or unsymmetrical nerves, the different kinds of irritation which are set up after injuries or diseases, produce diversified effects according to the organization of the part to which the irritated filament is distributed, and also according to the compound origin of the whole sympathetic system itself. Irritation in one or more of the filaments of the cardiac and pulmonic plexuses will derange the functions of the circulation and respiration, as we have already said. A similar affection in the hepatic plexus will be followed by a vitiation in the secretion of the bile, and the propagation of a severe irritation to the renal plexus will either check or disturb the secretion of urine. The manner in which the compound origin of the sympathetic nerves influence the effects of irritation in its individual filaments, is evidenced in the case of the stomach and bowels, as well as the heart. Every sensitive root of each spinal nerve, contributes a filament to the nearest sympathetic ganglion; and its influence over the stomach is manifested, not only by the sense of a comfortable glow, after a pleasant drink or hearty meal, but also by a sense of discomfort there when indigestion prevails, and of agonizing pain during the presence of inflammation. The same may be said of the whole track of the intestinal tube, to which no other nerve is distributed for any purpose.* The pains of colic, and of inflammation, must certainly be communicated to the sensorium through the sympathetic roots which have been adverted to. But the anterior or muscular roots of all the spinal nerves, also supply their contributions to the nearest sympathetic ganglion; and through these is derived the power of influencing the involuntary muscular coats of the heart, the stomach, and the intestines. These original roots are all more or less extensively associated by commissures with the roots of the spinal nerves, and thus irritations may be directly

* Very few now appear to doubt that the par vagum becomes the great, if not the special source of reflex action to all that portion of the digestive canal which it supplies, either directly, or by an inosculation of its filaments with those of the sympathetic.

communicated from wounds to any of the plexuses of the unsymmetrical as well as to the branches of the symmetrical nerves. Considered in this point of view, pains and spasms may well be associated for the purposes of practical consideration. They both occur in strong and in weak constitutions, and equally require modifications of treatment according to the character of each individual case. When a plethoric or active state of the circulation exists in company with a flushed countenance and warm skin, antiphlogistic remedies, in some shape, will always be proper, at least as preliminary treatment, for each kind of these irritations. When the face is pale, and the skin is cool, and the circulation not excited, opiates or narcotics of some kind are always resorted to by the profession, and sometimes in enormous doses, for both conditions. In both it is equally necessary to obviate all the causes of irritation in every part of the system. Emetics and purgatives are resorted to for the purpose of relieving the injurious influences of deranged *primæ viæ;* and attention to the state of the bladder, of the heart, and of the brain, is enforced whenever their condition may be supposed to influence either pains or spasms.

These affections may be further compared in various respects. They equally tend to the destruction of life, when developed to excess. Extreme pain or spasm will abolish the vital forces, either by operating with sudden intensity, as secondary causes of shock, or by exhausting them from frequent repetition. In milder degrees they indicate more or less favorable results, according to the circumstances under which they occur. We apprehend no danger from them when accompanying reaction to a moderate extent, or when the system is not sinking from other causes. We can always obviate such conditions by anodynes, if the measures which we have resorted to for relieving the other causes of disturbance do not immediately succeed. In cases where there is no pain or spasm, under circumstances where these ought to occur, we have equal reason to fear that the system is not able to resent the effects of the injury. If the relaxing effects of undue hemorrhage have not been the cause of this, we of course apprehend all the dangers of an insidious shock.

The effects of exhaustion upon the nervous system, whether it proceed from losses of blood, or from irritation or inflammatory excitement terminating in gangrene, will all be considered under their appropriate heads. At present it may be sufficient to suggest that they

are generally exhibited by slight muscular twitches or tremors, instead of spasms, and that the sensations are rather uncomfortable and distressing, from a feeling of horror or sinking, than absolutely painful. For their relief, direct stimulants, with vegetable tonics, and the most nutritious fluids are always prescribed. But the surgeon has only done a small part of his duty in directing such a treatment. He must, in some measure, perform the duties of a nurse, and witness, in person, the proper exhibition of these remedies, until nutrition has begun to regenerate the forces of life.

THE EFFECTS OF INJURIES UPON THE BLOOD-VESSELS.

Although we have anticipated many points in relation to this subject during the consideration of nervous derangements, still much remains to be said of vascular excitement. The blood-vessels become the efficient agents in the production of all organic changes; and practical surgery has everywhere to do with them in all its operations of experience. We will proceed, therefore, to consider them methodically, from their slighter and more immediate, up to their worst and ultimate forms of derangement. On considering this subject philosophically, proceeding by the steps of a rigid induction, there would appear to be no difficulty in comprehending it. But unfortunately the word inflammation, like most other abstract terms, has been somewhat too vaguely applied by authors, so as to designate a variety of conditions. Very slight as well as severe derangement of the blood-vessels, and those also which terminate in very different ways, producing no analogous effects in the organization, have all been indicated by its use. The consequence has been, that a considerable diversity of opinion is entertained by the profession in regard to the pathology and treatment of this disease. While the majority have, with John Hunter, regarded it as an increased action of the blood-vessels, requiring, in all cases, depletory treatment, a very respectable party have pronounced it to consist in a weakened condition of the same parts, producing a sluggish circulation, and requiring the very opposite remedies. Most authors attribute it to a deranged excitement of the solids exclusively; but there is now a movement in favor of a partial revival of the exploded doctrines of the humoral pathology, at least as far as regards obstructions from increased *butor* or depravity of the

blood. Great differences of opinion, moreover, have been entertained in regard to the very existence of the disease in many cases which have been called inflammations.

It would appear that the genius of Hunter had provided for this difficulty in the very commencement of his labors; for he asserts that "the term or idea of inflammation may be too general, yet it is probable that it may form a genus in which there is a number of species, or it may be more confined in its classification, and be reckoned a species containing several varieties." Some recent authors have adopted this hint of the great founder of surgical pathology, and attempt to limit the term to the designation of a mere species. They follow Andral in applying the term *hyperemia* to a genus including all kinds and degrees of vascular excitement; while they confine the term inflammation to those perversions of the capillaries which produce diseased excitement and change of organization.

The propriety of characterizing different states of life, whether in health or disease, by appropriate language, cannot be doubted, especially when we can thereby avoid the difficulty of confusion in our reasoning. Too great a degree of precision cannot be arrived at in such an important point as this which now concerns us; and we will, therefore, conform to the distinctions which have recently been made between the various states of vascular excitement.

The immediate effect of an irritation upon the small vessels is an increased injection of blood into them, which causes an appearance of a blush in all the exposed surfaces. This is not at first attended with any evident tumefaction, and was compared by Hunter to a simple blush of the cheek from a simple distension of the capillaries. It has been called by some an inflammatory blush, although no one has ever attributed to it any character of disease. If it does not subside, however, by a speedy contraction of the capillaries called resolution, that state of turgescence of the parts which has been termed the "*turgo vitalis*," or "*simple vascular excitement*," arises. In the more protracted state of irritation of the vessels, an accumulation of blood becomes evident, and the consequent tumefaction is augmented by more or less considerable effusion of the pale fluids into the intestines. In strong habits the actions are decisively increased, and the effusion consists altogether of the mixed fibrinous and serous portions of the blood which late writers have termed the *liquor*

sanguinis.* In torpid or leucophlegmatic temperaments, the actions are not only sluggish, but the effusion consists of the serum unmixed with the due proportion of fibrin. The temperature is hardly increased in such cases, nor is the color as florid as in the more active forms of vascular excitement. This latter condition is therefore denominated by some authors vascular congestion, and by some passive congestion, in contrast with which they put forth the simple vascular excitement when carried forward to its full extent, under the name of active congestion. Now all these points were fully and admirably treated of by the illustrious Hunter, under the heads of "union by first intention," and "union by adhesive inflammation." We should scarcely do justice to the memory of that great man, were we to omit crediting to him every sound physiological and pathological view in regard to these subjects, which has since been entertained by our profession. Neither new forms of arrangement, nor altered names, can hide or even overcloud the profound and luminous ideas which were first developed in the great work on the Blood, Inflammation, and Gun-shot Wounds. As these processes, when they occur in connection with injuries, appear to favor the reparation of such injuries, and afterwards terminate, under proper treatment, in a speedy resolution, they were characteristically denominated by him *healthy* inflammations. The irritation often passes, however, into a higher form of excitement, and then it exhibits a more durable and perverted mode of action. In this condition the nervous sensibility is not merely augmented, but it becomes decisively morbid and unremitting, so that every kind of impression, from internal as well as external causes, becomes distressing. The capillaries are still further dilated,† even paralyzed, the heat increases to a higher degree, the redness is more intense, and the tumefaction rises. In short, the four diagnostic symptoms of Celsus, "*calor*, *dolor*, *tumor*, *rubor*," are all associated, and then the morbid state termed by all surgeons inflammation, exists.

Even this condition is not necessarily destructive in its tendency, for when it occurs in connexion with open wounds, in healthy individuals, it produces reparation by the secondary means, and was therefore ranked by Hunter, as one of the healthy forms of inflammation; "because," as he said, "it has for its object the restoration of

* Vogel says, p. 379, "The term inflammation signifies capillary hyperemia, with fibrinous dropsy and its results."

† Hunter conceived that this was done by "an action of dilatation."

injured parts." He occasionally termed it true inflammation in contradistinction from erysipelatous, carbunculous, and other malignant forms of the disease. Whenever it occurs, however, underneath unbroken surfaces, or among the interstices of the tissues and organs, it is certainly destructive of the organization, and should be combated under all circumstances as a disease.

The doctrine of some of the general anatomists, that the different forms or theories of inflammation depend wholly upon the organization of the tissues, in which they occur, is altogether too refined and exclusive for our approbation. We shall everywhere admit, that the disease is modified by the peculiarities of texture, both in its local and sympathetic manifestations; but it always presents the same general characters in whatever part it occurs, and one and the same tissue is frequently found to exhibit very different forms of inflammatory action. The mucous membrane will under one form of this disease increase their natural exhalations and secretions in a slightly altered state, at another time they will throw off genuine pus either with or without ulceration; sometimes their inflammations will terminate in hemorrhage, and at others by an effusion of coagulating lymph into the interstices, which will produce a thickening or stricture of the part, or upon the free surface in the form of a loose and polypus-like exudation. The serous membranes, although still more simple in their texture, are liable to almost as great a diversity of modes of inflammatory action. They commonly exhale the plastic fibrin, and terminate by a speedy adhesion of the opposite surfaces, which circumscribes the disease to a small space around the injured part. Frequently, however, not a particle of fibrin is exhaled, and then the inflammation is rapidly diffused throughout the whole membrane, by continuous sympathy, like a spreading erysipelas, and speedily destroys life. This tissue often exhales a serous fluid loaded with broken flakes of coagulated and unorganized fibrin, and distends the cavity either locally into a circumscribed abscess, or generally into a dropsy. Sometimes it ulcerates under inflammation, and occasionally it becomes encrusted with a false and only partially organized membrane. The skin is notoriously liable to a great variety of inflammations, many of which cannot be accounted for by the peculiarity of the individual portion of it which is affected. But we need not occupy more time to prove a self-evident proposition. In the progress of our observations, we

shall everywhere see, that other circumstances modify the character of inflammation, besides the conditions of structure.

So much has been published in all the standard books of Surgery, upon the phenomena and pathology of inflammation, that it may appear a work of supererogation, now to enter at length upon the same discussion. A few points, however, must be adverted to, in order to render our subsequent inquiries intelligible.

REDNESS.

In the first place, in speaking of the most superficial symptom, we should observe that the redness is not produced by any constituent or elementary heat of the blood, gaining access to the distended capillaries in undue proportion, as the older writers supposed. The comparison originally made by Boyer, between the contents of small vessels, and capillary tubes of glass, illustrates the point very clearly. The blackest fluid will look pale and even transparent, when contained in very fine glass tubes; whereas, the natural color will reappear on admitting the same fluid into a vessel of larger bore.

There is no necessity, therefore, for supposing that the pale and uninflamed capillaries, naturally contain the watery parts of the blood alone; while in an engorged or inflamed state, they admit a larger series of red globules. Nor is there any reason for concluding, at least until the final stage has been developed, that the intense redness of an inflamed surface is owing to an effusion of the coloring matter into the cellular tissue. Inflamed parts are red, because larger columns of the homogeneous circulating fluids are passing through the minute vessels. This redness will of course be qualified in different cases, by the degree of activity of the powers, both of respiration and circulation. If the arterialization of the blood in general is defective in any individual, the redness of an inflamed surface will be dull or dusky, or even inclined to lividity. There is also another cause of the diversity of color alluded to by some authors. If the muscular dilatation is chiefly located in the capillary commencement of the veins, instead of the terminations of the arteries, the same dullness of color will be observed. In either case, however, the want of floridity in color indicates a deficiency in the activity of the circulating power, and in a corresponding degree modifies the character of the disease. When the color is yellowish,

as well as florid, there is an indication of accompanying bilious derangement. The tonsil is pale-red, or pinkish in the fibrous tissues, and dark or dull in the mucous membranes, corresponding to the degree of dilatability in their respective vessels. The redness is circumscribed, although gradually lost in healthy inflammations; irregularly diffused with determined edges, in erysipelatous ones, and linear or streaked in lymphatic inflammations of the superficial parts.

HEAT.

The next symptom of inflammation to which our attention is naturally directed is heat, the predominance of which has mainly characterized the disease in the nomenclature of all languages. The increase of temperature on the surface of inflamed parts, has always given rise to the idea of a species of combustion in them, and some term corresponding to *phlogosis*, or inflammation has, therefore, been employed by the people of all nations within our knowledge. The observations of Hunter, however, appeared to demonstrate, that the actual heat could hardly be elevated above the thermometrical point of the internal parts. The increased sensibility of the inflamed textures generally occasions a delusive perception of increased heat, which is estimated by the patient far above the actual rise, as indicated by the thermometer. The nerves measure the sensation, rather than the degree of heat. It is universally admitted, however, that on the outer surface, and especially on the extremities, where the processes of evaporation and refrigeration keep down the temperature of the healthy parts, the heat of inflammation is augmented, and often to the full standard of animal heat. Of late, moreover, it has repeatedly been demonstrated, that the temperature of some actively inflamed parts can be elevated a few degrees above the point of blood heat. It becomes, therefore, an interesting matter in pathology to inquire into the cause of this development. The explanations which are usually offered, must be admitted to be quite unsatisfactory to every critical inquirer; and we can hardly promise to afford a much clearer solution. The increased supply of arterial blood, brought fresh from the heart to an inflamed part, may indeed be supposed to raise the temperature up to the standard of blood-heat; but that circumstance alone could not elevate it to 101°, 105°, or 107° of Fahrenheit, as has occasionally been proved to

happen within the last few years. Nor does the blood undergo any such changes in composition, during the act of inflammation, as to develop so much heat. We know that the condition of the nervous system exerts a wonderful control over the power of resisting changes of temperature, and perhaps, we may be driven to the conclusion, that local perversions of its energies does influence the development of inflammatory heat.

SWELLING.

In the first stage of inflammation, the swelling is obviously dependent upon an enlargement of the vessels, and a consequent increase of blood, as it occurs in cases of simple irritation. The enlargement of the vessels, according to Hunter, proceeds not from a mere relaxation, or paralysis, but from an active dilatation of them:—according to the *neurobathlical* doctrine of the Germans, by *nervous antagonism*, whereby the irritation of a sensitive is supposed to create a relaxation of the muscular nervous filaments of the vessels. Although we may find it difficult to form any opinion in regard to such hypotheses, we can easily decide that other circumstances supervene in the formation of a swelling. Effusion of some kind into and among the interstices, speedily commences; and then the character of the inflammation is modified, according to the nature of the effusion. In hydropical temperaments, the pure serum is poured out frequently to the relief of all excitement, and this is afterwards absorbed without leaving behind any organic defect.*

In strong and dry temperaments, the pure elementary fibrin,† called the *coagulating lymph* by Hunter, is exhaled, and this speedily indurates the parts at the same time that it tumefies them. Or more commonly the *liquor sanguinis* (fibrin dissolved in the serum of the blood, when separated from the red globules), is effused, and this also indurates the swollen parts, in consequence of the coagulation of the lymph, and the subsequent organization of it in the interstices. The serous portion of the effused matter may be speedily reabsorbed, and nothing but an indurated swelling left, which also may slowly

* This is the œdematous inflammation of Hunter.

† Some recent authors have refined the nomenclature of this subject so closely as to call this exhalation *Euplastic* lymph, while they denominate the diluted fibrin the simple plastic lymph, instead of liquor sanguinis.

afterwards disappear, under the influence of depletory treatment. But in high grades of inflammation, those effusions do not tend to produce resolution. They are accompanied by a softening and gradual disintegration of the tissues, at least in the center of the swelling. Colored portions of the blood begin to be intermingled with them, and the pain is greatly exasperated, and complicated with a distressing sense of shivering and throbbing, and then suppuration commences.

In the common phlegmon—(the acute healthy or true inflammation of Hunter, is often termed phlegmonous)—these conditions are all combined in a regular series of circles around a common centre. The primary softening and disintegration of the tissues, combined with a bloody effusion, which is finally mingled with pus, occurs in the centre. The effusion of fibrin and liquor sanguinis around, and serous extravasation underneath the inflammatory blush, still more remote from the centre of the concentric circle. The subsequent secretion of pus, mixed with the broken down solids and fluids in the centre of the swelling, soon begins to fluctuate and present all the characters of an abscess.

PAIN.

This subject has been almost exhausted in our remarks upon irritation and upon heat. It ought not to be forgotten, however, that pain is very much modified by the different degrees of tension and density of the parts in and underneath which inflammation occurs.* The formation of a single drop of pus under the periosteum will cause the system more trouble than an enormous abscess among the yielding tissues. In some of the soft and relaxed parts, no sensation of pain is experienced in any of the stages of inflammation. Some temperaments, also, exhibit a peculiar idiosyncrasy in this respect. While one patient is distressed exceedingly by every slight pustule, another will hardly complain of an erysipelas, or an anthrax.

* The painful sense of throbbing is generally attributed to the sense of increased action in the vessels under pressure; but Mr. Liston's explanation is a more rational one: "The larger trunks propelling blood into the distended and comparatively inert capillaries, which are incapable of transmitting into the veins the same quantity of blood which they receive, will cause the throbbing or pulsating sensation."

The pain in some cases is so severe, as to prove destructive to life; while in others, it is barely sufficient to excite moderate reaction, and direct the attention of the patient to proper means of cure. The sympathetic propagation of pains, is also very remarkable in some cases. In inflammation of the hip joint, the distress is generally felt in the knee; the kidneys and the bladder affect the glans penis, the liver, the shoulder, &c. But in all such cases, the effect is produced through the reflex actions of the nerves, and not through any interchange, or association of filaments, as was formerly supposed. In short, the proposition may be safely laid down, that the same physiological explanations, which have been advanced under the head of irritation, obtain here. It should be noted, however, that the effects of pressure are very different in the two cases. The pain of mere irritation, is often relieved by pressure, as in colic and neuralgias. But in inflammations the pains are always aggravated by pressure. The pains of irritation, also, remit and frequently intermit completely; while those of inflammation steadily increase, with hardly a perceptible remission until the end. If they suddenly subside, so as to leave the patient entirely comfortable, we always have reason to apprehend the danger of mortification.

EXTENSIONS OF INFLAMMATION.

The propagation of true inflammation among the neighboring parts, is always limited by the exhalation of coagulating lymph, and the consequent closure of the cellular interstices. But where this process is prevented, or rendered morbid in any way by the influence of injurious causes, the actions will extend in various directions, as Hunter observed, according to the sympathies of the part originally affected. When the extension is made along the same parts or tissues, as through the skin, or mucous, or serous membranes, it is said to progress by *continuous* sympathy;—when it affects parts adjacent to each other, although different in structure, it is put down as an example of *contiguous* sympathy;—and when it involves a distant organ, as happens in cases of inflammation of the head producing abscesses in the liver, it is considered as an instance of *remote* sympathy. These extensions of inflammatory action, however, are somewhat different from the nervous sympathies which we have referred to for the explanation of mere irrita-

tions. It is more than probable that the blood-vessels and their contents in an altered state after disease, become the media of such extensions of inflammatory actions. We are naturally led, therefore, to consider as an important subject for investigation, the changes which the blood itself undergoes during inflammation.

INFLAMMATORY CHANGES OF THE BLOOD.

Before it became generally known that the capillaries, during a high state of inflammation, were softened and finally disintegrated in their texture, it was observed that the qualities of the blood underwent a decisive change. The slowness of coagulation, the subsidence of the red globules, the formation of a buffy coat, and the cupped appearance of the coagulum, resulting from its increased contractility, were all regarded as characteristics of inflammatory blood.

These conditions were wholly attributed, by Hunter, to an alteration of the vital properties of the living fluid; and as his celebrated doctrine of the vitality of the blood has been so frequently disputed by captious inquirers, it may well be considered as deserving a share of our attention. When first drawn from the living vessels, the blood certainly appears to be a homogeneous fluid which resists the changes of temperature, and the influence of all the causes of putrefaction, exactly in the same degree and to the same extent, as a fresh laid egg, and many other organized substances can do under the dominion of life. The subsequent acts of coagulation and contraction of the coagulum, were fairly compared by him to the living phenomenon of contraction of the muscles during life, and the stiffening of them after death of the animal powers. The same causes which facilitate the one class of phenomena also facilitate the other, and the same influences equally retard or prevent both. When sudden death is caused by a stroke of lightning, a blow on the stomach, or an overwhelming fright, the muscles neither stiffen, nor does the blood coagulate.*

* Some rare exceptions have been made to this proposition by authors. But in none of the cases where the muscles did not stiffen have I ever seen the blood resolve itself into its constituent parts. In two cases of drowning alone I observed the blood slightly thickened in the large veins: it could hardly be regarded as coagulated in either of them.

Putrefaction then commences much more rapidly in both these substances, because the principle of life has been suddenly abolished in them by the fatal infliction. We might go on to enumerate many other circumstances which illustrate the same proposition, but every reader must be familiar with the details of Hunter upon this subject.

The objections to his doctrine were chiefly drawn by his opponents from a consideration of the properties which some of the elements of the blood exhibit after their separation from each other, during the act of coagulation. They neglected the great fact that Hunter attributed the last act of life in drawn blood, to its coagulation; and that none of its ingredients could afterwards be expected to exhibit any signs of vitality. The difficulty in conceiving of vitality as independent of organization, was another cause of skepticism upon this point, and this was the very one which Hunter most zealously labored to counteract. There is no occasion, however, at the present time to extend our remarks at greater length. All now admit that the fibrin, the plastic, or the coagulating lymph, (as Hunter called it from its inherent power of coagulating,) is possessed of vitality during its residence in the living body. To its influence are attributed almost all the changes of organization, both in health and disease; and it would be regarded as next to absolute folly to question its possession of the great properties of life. We may say, in support of the great Hunterian doctrine, therefore, that the presence of coagulating lymph in every drop of the circulating fluid confers upon the blood the powers of life, even if we do not agree with the latest microscopists in regarding the two orders of globules as organized substances.

Concerning the changes in the composition of the blood wrought out by inflammation, there can be no dispute among pathologists. All agree that the proportion of fibrin is invariably increased; the only difference in opinion being exhibited in regard to the degree of increase in respective observations. Some experiments have appeared to prove that the proportion of this element in the whole mass is about doubled after active inflammation, while others have increased the estimate to more than threefold.* The best authority

* It may be laid down as a pathological axiom, that an increase of fibrin is always followed by a corresponding slowness in coagulating. But this is rather a proof of increased than of diminished vitality. Coagulation and the subsequent contraction of the coagulum, are the last acts of life in the blood, and the longer

upon this point is Andral, who has demonstrated the invariable increase in the quantity of fibrin during inflammatory affections, the increase being strictly in proportion to the intensity of the inflammation, and the degree of inflammatory fever accompanying it. He has, moreover, established the fact, in opposition to what we might have anticipated, that this increase of fibrin is no greater in the robust and sanguine, than in feeble and exhausted constitutions. Even in the latter stages of phthisis, inflammation around the tubercles will produce an excessive development of this material, and require the antiphlogistic treatment so forcibly advocated by Louis. These changes, however, are all to be ascribed to the effects of the local inflammation, and not to the accompanying fever; because idiopathic fevers alone do not develop any such increase in the proportion of fibrin. It is the real globules alone which are relatively increased in fevers. The proportion of fibrin has been proved to undergo a decided decrease in all idiopathic fevers. Andral's proportion is, that the peculiar condition of the disease called fever, consists in an increase in the proportion of the globules to the fibrin. When a local inflammation develops itself during the progress of a fever, the amount of fibrin increases; but its augmentation appears to be kept down by the febrile condition. In fevers of a low grade, whether typhus or typhoid, this decrease of fibrin is still more strongly marked than in simple continued fevers; while the increase in the proportion of the globule is equally evident. Of course no inconsiderable degree of allowance should be made for the different temperaments. In the sanguine and robust the red globules are naturally in excess, while in the chlorotic and anæmic these are not only deficient, but the diluted fibrin appears always to predominate.* In the former class of patients, therefore, a short period of inflammatory action may not begin to show the development of fibrin in excess; while in the latter a deceptive appearance of inflammation may be presented, without the supervention of any degree of

they are deferred, the greater is its tenacity of life. After a long deferred coagulation, and the consequent formation of a thick buffy coat, moreover, the contraction and diminution in the size of the coagulum become more evident, so as to produce its cupped surface.

* The appearance of a predominance of fibrin in chlorotic and anæmic blood is somewhat delusive, and arises, in a great manner, from its want of contractility. The clot remains large, and does not squeeze the serum out from its interstices. The edges are not turned up by increased contraction, such as occurs in inflammatory blood, and of course the surface is not cupped.

that disease. Cases have occurred in which a loose and flocculent collection of colorless fibrin has floated over a small mass of colored coagulum in a vessel of blood drawn from an anæmic or chlorotic person; and this appearance has been mistaken for the sign of inflammation, to the induction of a fatal repetition of the blood-letting.

The mode in which the blood is extracted from the vessels, and its subsequent management, also influence the coagulation and the separation of the different elements from each other. If it be drawn from a small orifice, drop by drop, or in a trickling stream, or if it be collected in a thin stratum over the bottom of a large vessel, especially if it be agitated frequently, and exposed to a warm temperature, it will coagulate speedily, and fail of exhibiting the buffy coat. The followers of Hunter are undoubtedly right in their belief that all such causes accelerate coagulation by their stimulating influences upon the living fibrin: discharges of electricity, the contact of metallic surfaces, and many other exciting causes will do the same thing; while perfect rest, a low temperature, the avoidance as much as possible of contact with foreign surfaces, by drawing a large and bold stream into deep and globular basins, will all tend to the retardance of coagulation. The ingenious Dr. Scudamore's hypothesis, that the presence of fixed air in the blood maintains its fluidity by a chemical power, and that every influence which favors its extrication accelerates, while all circumstances that prevent its escape retard coagulation, has not been adopted by intelligent observers. We must give him the credit, however, of having contributed his full share towards directing the attention of our profession to the uncertainties which attend the diagnosis of inflammation from the appearances of the blood.

The common opinion concerning the buffy coat on inflammatory blood has been, that it proceeds from a greater or less subsidence of the heavier red globules below the upper stratum, in consequence merely of its slow coagulation. Whether this slowness of coagulation proceeds from any direct influence of inflammatory action upon the vital condition of the blood, or from any changes effected in its chemical composition, no one has ventured to decide. But certainly the increased proportion of fibrin is connected with a less intimate union with the coloring matter than natural, because the moment the blood is drawn in many severe cases of inflammation, we can see the colorless stratum beginning to appear like thin jelly or melted glue, above and around the edges of the

uncoagulated mass. This is the appearance which has always been denominated sizy by practitioners, and which constitutes the buffy coat after it has coagulated. Slowness of coagulation is not, therefore, the only thing necessary to the formation of the buffy coat, inasmuch as the size often appears immediately after the blood has escaped from a vein. We can, moreover, but very rarely imitate the appearance of a buffy coat in cases unattended with inflammation, even by a full combination of all the modes of retarding the process of coagulation. It is only in the latter stage of pregnancy and some other conditions of plethora which probably verge on inflammation that he can thus, as it were, manufacture an imitation of the buffy coat.

This disposition to a more speedy and easy separation of the coloring and fibrinous principles of the blood in inflammations, is evinced in small quantities as well as in masses. If a very thin stratum is allowed to flow over a piece of glass the globules of inflamed blood will be seen immediately to aggregate themselves into clusters, leaving the intervals and edges pale and evidently composed of colorless fibrin and serum intermixed. The smallest drop of the same kind of blood, when placed in the field of a microscope, will, in the same manner, show an instant separation of the red globules from the liquor sanguinis, piling them up into columns like counted coin, with interspaces filled by the colorless globules and serum. We can easily, therefore, avoid the hazard of general blood-letting in doubtful cases; and decide whether inflammation exists or not by extracting a single drop of blood from the patient.

The pale globules or colourless corpuscles floating in the *liquor sanguinis*, are immensely increased during inflammation, and can also be demonstrated in the field of a microscope. According to some recent observations they not unfrequently compose almost the whole substance of the buffy coat. In the opinion of some physiologists they are nothing but the nuclei of the red globules in a resolved state, and divested of their coloring envelop.* But it is

* It is a most discouraging thing in the history of microscopical observers, that they have recorded so many opposite statements and observations. We have put down in the text the common opinion once universally entertained in regard to the constitution of the red globules, that they are composed of a colorless drop of fibrin or nucleus in the centre, which is surrounded by a capsule of coloring pigment, or one which is stained with the coloring matter of the blood. Now, however, it is becoming common to read from microscopical observations

now generally agreed that they are the parent or true formative cells of most organized structures, which become the exudation corpuscles in the track of wounds and injuries. Their increased development during inflammation would certainly appear to indicate a great exaltation of vital power, both in the solids and fluids. But no judicious practitioner ever trusts to a single symptom in making out his diagnosis. The whole assemblage of circumstances and symptoms we have described, and the state of the system also, are altogether taken into consideration before a decisive course of treatment in doubtful cases. The progress of the case and the results of the treatment are estimated in addition to the former particulars, and thus a sure and philosophical ground is always established for observation.

INFLAMMATORY FEVER.

Although some degree of constitutional disturbance must always arise from the direct irritation of a local inflammation upon the nervous system, still the chief modifications of febrile reaction can be traced to the altered condition of the vascular system. The primary increase of the circulation in all the vessels leading to an inflamed part, must extend by a continuous propagation directly to the heart and all the ramifications of the arteries. The subsequent perversion of the blood passing through the same part must speedily contaminate the whole circulation, and thus an additional and all-

that the capsule of the red globules is transparent, and that the central nucleus is the real colored portion of the corpuscle. Some, indeed, deny that there is anything like nucleus in the centre, and describe the composition of a red globule as a transparent capsule of globulin, filled with a colored drop of fluid called hæmatin. Nor have the uses of these globules been much better ascertained. Hunter attributed but very little importance to them, and Magendie thought they only served to demonstrate the circulation. Liebig, however, and most of the modern chemists consider them to be the true oxygen-carriers of the system, and believe that the coloring matter is the peroxide of iron while it circulates in the arteries, and the protoxide during its return through the veins. Until recently, nobody appeared to doubt that the red color of the hæmatin was owing to the presence of iron. But to add to all our perplexity in attempting to comprehend the nature and use of the red globules, Scherer has lately proved, or affected to prove, that their color does not depend on iron. He dissolved out all of this metal by the aid of acids, and then after boiling the residuum in alcohol, the deep red color was restored.

pervading cause of morbid excitement be distributed throughout the whole economy.* The shivering and rigors, the contraction of the pulse, restlessness, anxiety, pains in the head and loins, and other premonitory symptoms of fever, are attributable to this depressing influence, which will naturally be followed by all the symptoms of inflammatory reaction. The pulse rises in fullness and frequency, it becomes hard and resisting, and presents all the characters of an increase of circulating power. The action of the heart becomes strong and bounding. The respiration is quickened, the breath becomes hot, and the mouth dry. The tongue generally appears covered with a thick white fur or buff on the dorsum, the tip and edges being red and dry. The stomach is nauseated and frequently oppressed. An intolerable thirst arises. The bowels become costive, the skin hot and dry, the urine scanty and high colored, and, in short, all the exhalations and secretions defective.

Although inflammatory fever never intermits, it often remits slightly in the morning, and sometimes twice in the twenty-four hours. But the remissions are slight, and always accompany those of the local inflammation. The evening exacerbations of both the general and local affections also correspond. The fever generally follows the inflammation in the course of a few hours, sometimes not until two or three, or more days. In cases where it has been supposed to precede the inflammation, it has no doubt often happened that the tumultuous excitement of a sanguine or plethoric habit, which follows reaction from injuries, has been mistaken for

* In Mr. Liston's excellent work, "The Elements of Surgery," the following passage occurs, which condenses his authoritative views upon this subject, and I, therefore, transcribe it without indorsing the correctness of his pathology. "The functions both of the sanguiferous and nervous systems are deranged, producing a state termed symptomatic or sympathetic inflammatory fever. From some observations of my friend Mr. Gulliver, it is probable that this state is frequently, if not generally dependent on changes in the blood consequent on inflammation; a sort of decomposition of part of the fluid and vitiation of the remainder; the fibrin being separated and effused into the injured part for the purposes of reparation, while the blood globules are converted into pus in the capillaries and mixed with the circulating fluid. Thus the presence of pus in the blood may become the proximate cause of fever; but if an outlet to the matter be established, if it be discharged by the occurrence of suppuration in a cavity or on a surface, the case is benefited and the constitution relieved. This points to an important principle in practice. Nature puts it in operation in small-pox, for example—how favorable it is for the pustules to come out, and to what danger is not the patient exposed if they are repelled."

real fever. No increased formation of fibrin or of formative cells, however, having as yet occurred, the case can neither bear nor demand the same depletory treatment that will be subsequently required in the genuine inflammatory fever. A close observation will, as we have before stated, always enable a practitioner to discriminate between these two different forms of vascular excitement.

The circumstances which modify the form of inflammatory fever, so as to present a considerable diversity of character, should always be noticed by the student. Persons of slow or dull habits, whose pulse is habitually down to forty or fifty in health, will never exhibit a high appearance of inflammatory action, either in the vascular system, or on the skin. The highest range of febrile pulse will in them be from eighty to ninety, and the external heat will rarely be exalted above a moderate standard. They are apt to manifest arterial excitement in the form of a thrill or jerk of the pulse, the artery feeling hard, like a cord, and rolling under the finger. The vascular coats would appear to have undergone a peculiar induration in such cases, perhaps from a great increase of the contraction upon the column of circulating blood, so that even young patients may be suspected to have an ossification of their arteries. But this apparent induration subsides along with the fever; and the natural softness as well as slowness of the pulse always follows the restoration of the secretions. The action of the heart in such persons, especially when advanced in age, is very apt to intermit or hobble during fever, even when there is no reason to suspect organic disease in the valves or coronary arteries. It should be observed in relation to this class of cases, that direct depletion is the most important of all measures in subduing the inflammation and fever. Therapeutic remedies do not operate upon them with the same facility or extensiveness, as in ordinary habits.

In quick and irritable temperaments, where the natural range of the pulse is above eighty or eighty-five, the inflammatory fever is modified so far as to assume some of the characters of idiopathic nervous or synochus fever. The pulse rises to a much greater rapidity than in inflammatory fevers of common habits, and is generally smaller and more quick or irritable in its beat. It is a common thing to count one hundred and twenty, and one hundred and thirty beats in a minute in such cases; whereas from ninety to one hundred and eight or one hundred and twelve, is the average range of good constitutions in the same disease. The respira-

tion is also more hurried, and the secretions are more thoroughly arrested. As the pulse never fails of affording resistance to the pressure of the fingers, and in all other cases presents the characters of augmented force, it is hardly possible to mistake this for a mere fever of irritation, especially when the local circumstances and phenomena are taken into consideration. The only practical matter which deserves notice here, is, that a repetition of direct depletion will not be so largely or often required as in ordinary cases; while refrigerants and antimonials are apt to prove exceedingly efficient.

It is hardly necessary to speak of the modifications which constitutions habitually afflicted with hepatic derangements, or excessive nervous mobility, exercise upon fever. It will be obvious to every practitioner, that a combination of mercurials in the former class, and of opiates in the latter, will afford the proper aid to antiphlogistic treatment.

But the influence of inflammation in particular tissues and organs upon the consequent fever, is a very important matter in pathology. In the mucous membrane of the stomach and bowels, it disturbs the constitution much more than in the lungs, or nasal passages; in the serous membranes it proves still more exciting; and in some parts of the outer integument it is much more distressing than in others. In the fibrous tissues, especially when it is decisively of a rheumatic character, it excites a very high grade of inflammatory reaction, and more rapidly and thoroughly deteriorates the qualities of the blood. In the vital organs, however, the most important modifications result. When the membranes of the brain are affected with inflammation, the actions of the arteries and capillaries are all excessively irritated and high, and the secretions are very obstinately closed. When the substance of the brain is inflamed, there is not only a torpor of its functions as manifested by coma, but a general oppression of all the other vital functions which depend on its influence. The breathing will be slow and heavy, the action of the heart slow and moderate, and the arterial tissue relaxed and yielding. Acute and severe inflammation of any of the vital organs, especially in the abdominal region, generally depresses the pulse in a remarkable degree, so as to contract it to the size of a small wire or thread. Care should always be taken not to mistake this for a pulse of debility or sinking. Its resistance to pressure, taken in connection with all the accompanying circumstances, will, how-

ever, prevent the possibility of a mistake on the part of an intelligent observer. Free blood-letting unlocks this pulse and raises it to a natural fullness in a short time, by its power of overcoming the intensity of inflammation and consequently removing oppression from the vital forces.

TREATMENT.

Although symptomatic fever is naturally disposed to hurry on the local inflammation to a disorganization of the tissues in which it occurs, still spontaneous efforts are sometimes made by the system, for its own relief. Under the expectant treatment of the imitators of homœopathy, a resolution of the inflammation is always followed by a subsidence of the fever; and a very moderate course of antiphlogistic treatment still more often directs the efforts of nature to a favorable result. By a restoration of the secretions under the use of diluent drinks, abstinence and rest, febrile reaction is sometimes gradually overcome, at the same time that the inflammation undergoes resolution. A full perspiration, intestinal looseness, and a copious discharge of urine, are, under such circumstances, said to be critical, and the cure is thought to be spontaneously developed. But how injudicious it must be to depend upon such a course of treatment, will appear when we advert to the numerous cases of death which occur from internal impaction or suppuration of the vital organs. Even slight injuries would be liable to terminate either in a derangement of structure, or total disorganization of the surrounding parts, and the recoveries would all be fortunate escapes from unnecessary danger. What experienced surgeon can doubt the importance of active interference with the course of nature in this condition of things, when he every day sees the most imminent inflammation at once arrested, and the symptoms of reaction all overcome by prompt depletion and its accessories.

Notwithstanding all we have said respecting the danger of indiscriminate blood-letting in cases of mere plethoric or tumultuous excitement, there can be no doubt of its safety or efficacy in decisive inflammations. The system undergoes a remarkable change under the influence of inflammation, in consequence of which blood-letting can be borne even by persons of the feeblest constitution. Most pathologists have coincided with Dr. Williams in the opinion that

this change arises from an "increased excitability of the heart, and tonicity of the arteries, which maintain a sufficient force and tension to preserve the circulation, especially through the brain, even when much blood is lost." But it may be conceived that the changes wrought out in the composition of the blood, contribute their full share towards setting up this tolerance of bleeding in inflammation. Certainly it does appear that in direct proportion to the increase of fibrin and formative cells produced by this disease, the system is enabled to undergo every species of evacuation. Even after very large detractions of blood in such cases, there will then remain enough of its living and organized elements to maintain the necessary degree of stimulation to the brain and blood-vessels. It is an admirable provision in the natural laws that qualifies most of the organs to bear the influence of such remedies as are calculated to remove their respective diseases. Thus, the nervous system, when afflicted with painful or spasmodic diseases, will tolerate much larger quantities of opium and other narcotics than in health. From sixty to one hundred grains of solid opium have often been given in a day for colica pictonum, and in tetanus, without producing any stupor, or other narcotic effect; the whole influence of the remedy being exhausted in overcoming the disease. Enormous quantities of stimuli are given, on the same principle, in some of the prostrate states of the system from diseases, without producing anything but a salutary effect; and prodigious doses of antimonials are tolerated in inflammations of the chest. In painful retentions of urine, and in strangulated hernias, a strong decoction of tobacco has been successfully injected into the rectum, without exciting either nausea or prostration; and in several forms of syphilis, mercurials can be given to almost any extent, without leaving behind any injurious effect.

In all severe cases of inflammation attended with high symptomatic fever, blood-letting is necessary, not only for the purpose of moderating the arterial excitement, but also to relax the exhalant and secretory systems. As preparatory to the institution of other appropriate remedies, neither sudorifics, purgatives, diuretics, nor anodynes, can act favorably during an inflammatory state of constriction in the capillaries. Although a combination of each of these classes of remedies with nauseating doses of antimonials, will often direct their efficacy more immediately to the secretions, still such combinations are always more certain and active after a previous relaxation from blood-letting. Blisters and other counter-irri-

tants act in the same way much more favorably as subsequent auxiliaries to the great preliminary measure in inflammations. They hardly ever, indeed, fail to do harm when too early employed under the same circumstances. Even topical depletion, whether in the form of cups or leeches, should be deferred until a later period of the disease, when the general excitement has been, in a great measure, subdued by the influence of blood-letting and other constitutional remedies.

In ordinary cases of inflammation, especially when resulting from wounds and other external injuries, one or two moderate blood-lettings generally suffice. They should be pushed to the extent of moderating the vascular excitement, and not to full syncope. Saline cathartics combined with antimonials, and cooling drinks with evaporating lotions, will afterwards subdue the irritation in most cases and promote resolution. Reaction is apt to follow large detractions of blood in such cases, which will require repetitions of the remedy until the danger of constitutional irritability is incurred. To prevent this result opiates are usually given, after proper evacuations, in combination with antimonials, for the purpose of allaying irritation and promoting perspiration. In severe inflammations, however, and especially of the internal or vital organs, repeated and large bleedings are frequently required. The first operation will, in these cases, sometimes raise the pulse instead of lowering it, and develop a great increase of the excitement. The oppression from the overloaded venous sinuses and auricles of the heart being removed by the first blood-letting, the action of the heart becomes more free and vigorous, and then an apparent increase of the disease follows. This fact was not understood by the celebrated Louis when he asserted that blood-letting, during the first four days of a peripneumony, always proved injurious. He bled but once each day, and did not afterwards resort to the proper means of overcoming the subsequent reactions. In all such cases the patient should be watched incessantly; and the orifice be reopened from hour to hour, and a repetition of the blood-letting enforced as often as the pulse rises, until finally all efforts at reaction are overcome. In this way alone the most violent and dangerous inflammations of the internal organs can be subdued. Of course all the adjuvant or accessory means of treatment should at the same time be actively employed. The severe cases of peripneumonia, in this country, would all die or pass beyond redemption without such treatment.

The same thing may be said of severe inflammations of all the other vital organs, with the exception of the mucous membranes of the thoracic and abdominal viscera, no matter from what cause the inflammation has proceeded. The reactions which succeed the large blood-lettings required for subduing all intense inflammations must be kept down, or the local excitement will be more rapidly hurried on to disorganization of the inflamed tissues. The necessity, however, for numerous repetitions of this remedy can in most cases be obviated by an active resort to antimonials and topical depletion, followed by the appropriate means of counter-irritation.

In regard to the influence of blood-letting, the general opinion has been, that it relieves inflammation and fever by its evacuant effect upon the heart and arteries. But something more is done than merely diminishing the distending force by which they are excited. A positive change in the inflammatory state of the blood is effected by the operation. Not only the relative proportions of the red globules (or oxygen-carriers of Liebig), but the increased quantity of pale globules and fibrin are also diminished, and that so suddenly as almost to give countenance to the idea that they are exclusively withdrawn from the circulation. It is universally agreed that the red globules, in a state of full oxygenation, are especially stimulating to the living solids, and no doubt can be entertained that the augmented proportion of fibrin and formative cells after inflammation, must prove a cause of exasperation to the symptomatic fever, if it does not cause that disease. The diminution of these elements of the blood must, therefore, be a source of mitigation to the fever as well as the relief of the over-distention of the blood-vessels.

MERCURY.

As an adjuvant to blood-letting mercury is considered to be the most powerful of all the antiphlogistics. Its action upon the system is productive of almost the same changes upon the inflammatory state of the blood. It certainly alters the red globules, and diminishes the undue proportion of the fibrin in a remarkable degree, and will in a short time break down the inflammatory exudations and adhesions among inflamed parts, which have resulted from the preceding stages of the disease. It is, therefore, almost universally depended upon in this country for the purpose of removing the de-

rangements of organization, which active inflammation may have produced in many of the tissues of the body. How often do we not see it clear up the axis of vision, by exciting a speedy reabsorption of the masses of lymph which have been effused into and behind the pupil by rheumatic and syphilitic inflammations. After acute pleuritis, we all know how speedily the same influence will disperse the inflammatory adhesions, the false membranes, and the liquid effusions, especially when aided by the external discharges of blisters and other counter-irritants. In the same way a great variety of other organic derangements from inflammation in the joints, in the glands, and in the parenchymatous substances of the viscera, will speedily yield to the action of mercury. But the remedy is a Samson to do evil as well as to do good. If it be resorted to as a constitutional remedy in the first stages of the disease, it will be sure to augment the disturbance, and, perhaps, pervert the fever into a morbid form of irritative excitement.

As a mere cathartic, mercury, especially in the form of calomel, may be employed along with blood-letting in the earlier stages of the disease. From its peculiar influence over the liver, it is thought to be a useful precursor or adjuvant to other purgatives; inasmuch as a free discharge of bile always favors the reduction of febrile heat. But as a constitutional remedy it is more generally depended upon for the removal of the sequela of inflammations. It is then given in small doses of from one to five grains, in combination with half a grain of opium, or an equivalent of Dover's powder every second or third hour, until a decided impression is made upon the system. It is by no means necessary, however, to excite a full salivation. The slightest influence upon the gums or increase of the salivary discharge, will indicate the period for suspending the use of the remedy. At that period its influence over the diseased capillaries will have been fully manifested. By its power of exciting in them a species of tonic contraction, it checks all further effusion; and by its similar influence over the absorbent vessels, it expedites the removal of all the previous exudations. To the extent which we have here laid down for the use of the remedy, it certainly may be employed with perfect safety after the reduction of active inflammation by previous treatment. The same course may, also, be repeated from time to time, in cases where an obstinate persistence in the morbid state requires such treatment. As we shall prove, in the discussion of similar circumstances occurring in syphilis, the

system has acquired a tolerance of mercury, by virtue of which this too unpopular mineral may be employed with as much safety as efficacy.

ANTIMONY.

This mineral, especially in the form of the tartrate, is more directly sedative over the vascular system, than any medicine with which we are acquainted. It is of course very much relied on by the profession in all countries, as an antiphlogistic. In Italy, it was formerly introduced as a direct contra-stimulant, and is now given by the followers of Tommasini and Rasori, in enormous doses, for the cure of inflammations. But in this country, it is administered only in small doses, sometimes with a view to its nauseating effect, during the continuance of which the actions of the heart and arteries are prostrated to a remarkable degree. But after proper depletion, this distressing form of administration is by no means necessary in the cure of inflammations. When given in very small doses of one-eighth to one-sixth of a grain, dissolved in an ounce of water, it appears merely to relax the capillaries, and thereby induce diaphoresis and other exhalations, at the same time that it subdues the morbid heat and thirst of fever.

If these small doses of tartar emetic should happen to nauseate or even vomit the patient at first, the stomach will soon become accustomed to it, and after a few repetitions of the dose, it will cease to prove distressing. It may, therefore, be continued for several hours, or days, if necessary, in succession, with perfect impunity in most cases. Even the quantity may, after a short period, be largely increased, as the stomach soon acquires an amazing tolerance of the remedy. In combination with diluent drinks, many surgeons employ it in this way, almost to the exclusion of blood-letting. It is far better, however, in general to precede it, or at least accompany it by proper depletions; while at the same time combinations with neutral salts, or mercurials, will favor its antiphlogistic influence. In cases of painful excitement, and morbid vigilance, the salts of morphia may be given in combination with the antimonial with great advantage. The diaphoretic effect will then be increased, and the sufferings of the patient tranquilized by gentle and refreshing slumbers. Opium, in large doses, either alone or in combination with other remedies, will sometimes be necessary in very painful cases of inflamma-

tion. As in acute peritonitis, and the iliac passion, the pain must be allayed, or the irritation cannot be overcome. From two to three grains of solid opium are often given in such cases every second hour, in combination with calomel, or tartar emetic, until the pain is fully tranquilized; by which time the influence of depletion will have been enabled to manifest its power over the inflammation.

Very little need be said in regard to the other points which have been so fully discussed by authors in their history of the treatment of inflammation. As to rest and diet, the very instincts of the patients themselves generally provide for their adoption. The inflamed part is universally kept, as nearly as possible, at rest in such an elevated posture, as will favor the return of the blood through the veins into the general system, by the aid of gravity. If the patient craves anything more than diluent and cooling drinks, his stomach should be appeased by some light farinaceous gruel, or vegetable infusion, which is destitute of all stimulating properties. The danger of relapse should always be prevented by denying the patient every kind of animal nutriment, until the tone of the stomach and vascular system is fully restored, and then only by slow degrees, should he be allowed to indulge in a full appetite. As to the temperature of the external applications, there will always exist some difference of opinion in practice. In general, we may observe that as long as the whole surface is hot, during the active period of symptomatic fever, cold applications to the part, and cooling ablutions over the whole body will be most appropriate. Indeed, as long as there is any hope of terminating the local inflammation, by a resolution, cooling applications are to be continued. But after painful distention, swelling and throbbing have occurred in the part, warm applications become more soothing, and grateful to the patient. They promote the relaxation which is so necessary to effusion, and thus relieve the painful sense of constriction and irritation, at the same time that they determine to the surface, and promote relief by perspiration. Instead, however, of the common applications of filthy and greasy poultices, it is far better to envelop the inflamed parts in soft lint, or cloths wrung out of warm water, and covered with oiled silk, or varnished cloth. This dressing maintains for a considerable period the comfortable sensations of warmth and moisture, and by reapplying it as often as may be necessary to keep up this effect, the irritation will be soothed, and the abatement of the inflammation promoted. The topical application of warm vapor, or

steam, as originally recommended by M'Cartney, of Dublin, has been advantageously used for the same purpose; but although his apparatus is very simple, and may easily be constructed in the domestic way, so as to continue the application of steam for a long time, to an inflamed part, the mass of practitioners have preferred the warm fomentations as above described.

After the irritation and excitement of an inflamed part have, in a great measure, been overcome by the influence of such measures as we have now described, the disease may be regarded as almost chronic in its character, and then will come in, as proper remedies, the so much abused class of counter-irritants. Some practitioners begin with vinous or alcoholic, or ammoniacal stimulants directly over the part, under the idea of exciting a contraction of the over-distended capillaries, and a consequent removal of the stagnated blood. If they fail in this attempt, they next resort to blisters over the surface, which they afterwards dress with mercurial, or camphorated-mercurial ointment. Others resort to the tincture of iodine, or to iodine ointment, for the same purpose, and it cannot be denied that their intentions are often borne out by the result. The distended and almost paralyzed capillaries are sometimes excited into a renewal of their circulatory actions by such applications, and the inflammatory exudations are often reabsorbed by the same influences. But care should always be taken, as we have before observed, not to resort to such practices in too early a stage of the disease. Depletion should be carried out to its full extent; and the influence of all the other antiphlogistic remedies also be endured, before a successful effort can be made in this way. Of late a much more certain and effectual external application has been introduced into our practice, and this can be made to subserve a variety of purposes. In fact the nitrate of silver has become almost *the* remedy of surgeons: and it becomes necessary, therefore, to speak of it under the head of topical antiphlogistics.

The nitrate of silver was early employed as an escharotic to inflamed and irritable ulcers, and surgeons have always regarded it as an excellent application for promoting healthy action on such surfaces. It has also for a long time been used as a vesicatory over deep seated and painful inflammations. By applying a very strong solution repeatedly by means of a wash over an inflamed joint or its envelops, and over an inflamed bone or its periosteum, we often witness the most prompt and decisive relief. It not only

operates much more speedily than a common blister, but it appears to possess a peculiar power of relieving pain. We often see an excruciating pleuritis or hemicrania relieved in this way, when no common vesicatory or counter-irritants could do more than slightly palliate.

Within a few years past, the nitrate of silver has been introduced into practice in a milder form, as a direct application to inflamed surfaces; and its range of services, in this way, has now become quite extensive. At first it was employed in a weak solution to the surface of an inflamed conjunctiva; afterwards its strength was gradually increased, until finally the solid stick of lunar caustic was applied not only to ulcers on the cornea, but also to chronic and even acutely inflamed surfaces of the entire membrane itself. Acute purulent conjunctivitis was the end primarily attacked by this remedy, without being preceded or accompanied by any decided depletion, and the most astounding results followed the treatment. The practice of ophthalmic surgery became revolutionized in this respect, and now it is hardly possible to lose an eye from that once dreaded disease. The same treatment was extended to inflammations of all the other mucous membranes; and now nothing is more common than to cure diseases of the nostrils, throat, œsophagus, stomach, urethra, vagina, and uterus by the sole use of this remedy. To inflammations of the skin, of almost every kind, it has also been applied; and at present no remedy is so much used as a sedative application over every irritated surface. To check the progress of an extending erysipelas, it is often smeared over the sound skin just around the border of the inflamed edge, so as merely to dry and blacken the cuticle. But it contributes more towards the relief of this disease, by applying it in the same mild way over the whole of the reddened surface. The burning sensation is almost immediately relieved by this mode of application, and the cuticle not only dries and turns black under the subsequent action of the light, but it becomes a protective pellicle or dressing to the disease. Herpetic and gouty inflammations of the skin may be overcome in the same way, and in short, almost every superficial inflammation will yield to this treatment. It will also contribute very much to the relief of inflammations below the skin, deadening the surface under the same mode of application. Many painful inflammations of the eye are mitigated amazingly by blackening the palpebræ; and most of the rheumatic inflammations about

the head, and brows, and face, can be appeased in the same way. The remedy not only appears to benumb all the cutaneous tissues, but it penetrates more deeply and acts as a sedative to all the nerves below.

Some practitioners employ the nitrate of silver as an escharotic, over inflamed joints and other deep seated affections. They either rub the solid stick repeatedly over a certain space, or they dress the part with the caustic ointment, and excite pustulation in the course of a few hours. This may afford some advantage over the common issue or seton, but on the whole it should be ranked in the same category of remedies. In the deep seated inflammations, discharges of pus do certainly afford more relief than simple vesication, or topical blood-letting, because the impression is longer continued, and because, as some think, they direct the suppuration towards the surface, and prevent the retention of pus in the blood. The actual cautery, formerly so much used by the French surgeons, is now confined to cases of inveterate caries of the spine, and the hip joint, but in this country few patients can be induced to submit to so frightful a measure.

SUPPURATION.

When the higher inflammatory process has continued for a short time, and has become complicated with rigors and throbbing, the stage of suppuration commences, which some have denominated suppurative inflammation, and others the termination of inflammation in suppuration. In the centres of a circumscribed true inflammation, the obstructed capillaries first become softened, then disentangled and confounded with a mixed bloody and fibrinous effusion, to which is speedily superadded unaltered exhalation, or secretion of some of the elements of the blood called pus. At first these substances are so commingled that it is impossible to distinguish any one peculiar principle in the matter thus generated in the centre of an inflammatory swelling. From this circumstance it has occurred that different opinions have been entertained concerning the origin of pus. Some have insisted too much upon the fact of a partial disintegration of the solids, and have, therefore, decided that pus is always the result of a putrefactive mixture of the solids and fluids, which varies in different cases according to the predomi-

nance of one or other class of materials, and also according to the ultimate degree of decomposition to which the process of putrefaction may have arrived. The majority of pathologists, however, agree with Hunter in the opinion that genuine pus is a secretion from the living vessels themselves, as different from any of the natural elements of the blood as is the milk, the urine, or the bile. This opaque, yellow, or straw-colored fluid is of a creamy consistence, and originally destitute of disagreeable taste and putrefactive odor. It soon increases in quantity, and when confined among the interstices of an inflammatory swelling, distends the surrounding parts into a cavity called an abscess. The walls of this cavity are afterwards extended in every direction, but chiefly towards the nearest outer surface, by the process of absorption. The debris of broken down vessels and primary effusion of lymph by this time disappears, or rather is concealed in the increased mass of thick and genuine pus. Sometimes, however, it remains in bulk in connection with a portion of the softened and sloughy cellular substance, so that it floats in the pus and is denominated the core of the abscess. This appearance is generally confounded with the sloughy cutaneous follicles in cases of small furunculi of the skin, which proceed from an obstruction of these follicles terminating in inflammation and destruction of their vitality. The latter affection, however, is a mere furunculus, while the former and deeper one has always been denominated a phlegmonous abscess.

But the formation of pus is not confined to the generation of abscesses. It is formed on the free and exposed surfaces of all wounds when they are not repaired by the simple processes of adhesion or fibrinous exudation. It is secreted also from the surfaces of all the mucous membranes, even when inflammation there, is unattended either with ulceration or excoriation. Moreover, the unbroken serous surfaces can secrete purulent matter, although it is not often of the genuine character which we shall describe.

As pus is liable to be mixed with the various mucous and serous exhalations of all these surfaces, it, of course, will present a considerable diversity of appearance in different cases, and some have regarded it as a difficult matter to distinguish it from other animal fluids. When it is first discharged from a healthy abscess there can be no difficulty of this sort. It is then homogeneous in appearance and insoluble in water, though easily mixed with it under agitation. It is considerably heavier than water, and, of course, sinks

to the bottom in a vessel containing it. It is coagulated by the muriate of ammonia, and is evidently composed of globules floating in a serous fluid, rendered opaque by numerous small granular molecules of coagulated fibrin floating therein. The globules are supposed to be composed of degenerated red globules, which appear granulated and somewhat rough and broken under the microscope. This is called laudable or genuine pus—sometimes it is said to be true or healthy pus. It differs from the mucous exhalations of the lining membranes in many respects. The latter floats in water, except when it has been very much inspissated; and it is destitute of globules, at the same time that it is not coagulable by the muriate of ammonia. The mucous expectoration from the trachea is sometimes distinguished from pus with difficulty; but masses of it never present that thick, round, and well defined margin to which authors have applied the term "nummulated."

The notion that pus is an acrid or corrosive fluid, capable of softening and disintegrating the surrounding tissues, has now become obsolete. Certainly healthy pus is never possessed of such injurious qualities. But in some situations it will undergo putrefactive changes and become exceedingly offensive, although it has been secreted among sound parts, in consequence of a healthy inflammation. This is almost invariably the case with abscesses in the mouth, fauces, and throat, in the neck near the trachea and œsophagus, along the track of the larger intestines, about the anus, vulva, and, in short, wherever the influence of the mucous secretions and fetid exhalations can reach the walls of an abscess. It seems as if the process of endosmosis could attract, in a powerful manner, all the neighboring causes of putrefaction into the cavity of the pyogenic membrane which contains the pus. A disgusting odor of sulphuretted hydrogen, or hydrosulphate of ammonia, always escapes from the opening of such abscesses, which can only have resulted from the development of putrefaction within. They are, therefore, very properly called fetid abscesses by surgeons; and to prevent the circulation from being contaminated by the absorption of their foul contents, all haste should be made to evacuate them.

If the parts around an abscess have been contused in any way, as by rough handling, unequal bandaging, blows, or violent exercise, then pure blood may be effused along with the pus, and imperfectly coagulating with it, there will be constituted what is called *grumous pus*. *Sanious pus* is the result of morbid inflamma-

tions, like phlegmonous erysipelas, which terminate in an unhealthy deposit of dissolved blood and serum under the skin, in no respect resembling true pus. This is very apt to become acrid and destroy the cellular substance, into which it infiltrates. What is called *sanies* is a very fetid ichor or watery serum, discolored with broken down or dissolved red globules of the blood. In weak leucophlegmatic habits, collections of thin and watery fluid occur, which are called *serous pus*. In scrofulous constitutions the serous collections are loaded with curds or flakes of coagulated albuminous substance, which are compared to disintegrated tubercles, and these are regarded as *scrofulous* pus. *Sero-purulent* and *muco-purulent* discharges are compounds of pus, and the exhalations from serous and mucous membranes in an inflamed state. It is obvious that a limited portion of either of these membranes may secrete true pus, while the surrounding parts may be discharging an increase of their natural exhalations under an inferior degree of inflammatory action. *Specific pus* is loaded with some kind of contagious virus, as gonorrhœal, chancrous, or variolous.

The idea of the solidists that none of these kinds of purulent matter can ever be absorbed into the system so as to produce injurious consequences, is certainly a mistaken one.* Although John Hunter successfully combated the doctrine that hectic fever was caused by absorption, he never thought of maintaining the opinion that other derangements could not follow from this influence. The best modern surgeons now believe that the elements of pus may be retained in the blood-vessels, as well as absorbed to the great injury of the constitution. Especial care is, therefore, taken not only to promote a free suppuration, by emollient poultices, or other relaxing applications, as soon as that process is discovered to be necessary, but also to ensure an early evacuation of it by proper incisions. The long continued presence of pus, moreover, among the living parts by over distending, or pressing upon them, or by impeding the

* Some have declared that the true pus globules are too large for absorption into the unbroken capillary vessels. But their capsules absorb, by endosmosis, the watery parts of the surrounding fluids, when they float in a rarer medium than their contents, and then burst open, and discharge their small granules of such a size as admit of an easy absorption. When the pus globules are left in a thick and viscous fluid of a denser character than their contents, the capsule gives out its contents by exosmosis, and shrinks up into a smaller space, so as again to submit to absorption.

natural circulation through them, often gives rise to serious difficulties. The bones may in this way become diseased, the fasciæ and tendons, or even the muscles, may slough, or extensive devastations be produced in the cellular tissue.

The timidity of inexperienced practitioners is always the cause of injurious delays in opening abscesses. They are deterred by the fear of puncturing some blood-vessel, or of a failure in entering into the cavity which contains the matter, and they therefore wait from day to day for the abscess to point, by a slow absorption of its walls, over the centre of the swelling. A very little experience and observation, however, ought to instruct practitioners in regard to this subject. In addition to the characteristic symptoms of suppuration in the parts below, a reddish œdematous, or puffy appearance, attended with a slight pitting on pressure, will be presented on the surface of the swelling containing purulent matter. This is almost invariably seen, except when the pus is forming in the palmar or plantar regions, and then the puffy and erythematous appearance is to be found on the dorsum of the affected membrane. But there is a much more decisive sign of such a collection to be derived from its fluctuation. If the surgeon, instead of pointing one finger at the swelling, and twitching it away again, as if he were afraid of being burnt or bitten, would only apply the palmar surfaces of the opposite fingers of each hand, and make slight alternate pressures or percussions with one, carefully feeling at the same time with the others over different parts of the tumefaction, he would easily be able, in all cases, to decide about the propriety of resorting to the bistoury or lancet. If the swelling be very small, he should employ only the index finger of his two hands on each side; if it be a large one, all the fingers of each hand should be applied to the opposite sides or extremities of the suspected abscess. By this mode of examination alone, is it possible for any one to acquire the so much boasted *tactus eruditus* of surgeons. The impulse communicated to the subjacent fluid by the percussion of one hand, can then be felt as a wave-like rolling or fluctuation under the fingers, which are kept at rest on the opposite side of the swelling. A slight experience will enable any one to distinguish this peculiar sensation from the retraction of the muscles, or the trembling of the other soft parts when examined by the same kind of impulse. The fears of hemorrhage on the part of the surgeon, can then be very easily allayed by a careful consideration of the anatomy of the parts, and by carrying

the requisite incision in a direction parallel to the course of the neighboring vessels. The frequent cause of failure in reaching the collection proceeds from not penetrating completely the subjacent fasciæ, which confine all deep-seated abscesses. If the incision be commenced by the puncture of a bistoury or lancet, the experienced sense of touch can always decide when the instrument has reached the cavity; and the puncture being then enlarged to a sufficient extent, by a cutting motion of the instruments in a parallel direction to the blood-vessels, all danger of troublesome hemorrhage will be avoided.

ULCERATION.

A timely incision made into the cavity of a healthy abscess, is always followed by a subsidence of the local irritation, and symptomatic fever; and the processes of reparation and closure are instituted immediately thereafter. But a delay of this surgical procedure necessarily involves a protraction of the irritation and fever; and moreover, requires the additional excitement of a painful and corroding ulceration, to direct the matter to the nearest surface. The stage of ulceration was supposed by Hunter to be wholly accomplished, by the action of the lymphatics, until it reaches the cuticle, which tissue, being unorganized, must either be ruptured or laid open by an incision. The experiments of Magendie and others, however, have demonstrated that the blood-vessels can of themselves perform the office of absorption. It is, moreover, maintained by most of the later pathologists, that ulceration can be effected by the inflammatory softening and disintegration of the affected tissues, independent of all absorption. The debris of the ulcerated or corroded parts, must then be mixed with the pus, and float out along with it on the discharge of the abscess. No matter, however, in which way we decide that the process is effected, it is always a tedious method, and one attended with the painful sensations of gnawing and biting. It must be considered to be a very bad piece of surgery, therefore, to subject any patient to such unnecessary agony by the delay of prompt opening into an abscess.

GRANULATION.

Before an abscess has been opened, the opinion of most pathological anatomists has been, that the pyogenic membrane, which lines it, partakes of the characters of a serous membrane; while immediately after the opening, it begins to assume the type of a mucous membrane. In justification of this idea, it may be observed, that on first laying open the cavity by a free incision, so as to expose its interior, we always discern a perfectly smooth surface, exactly like the appearance of a slightly inflamed serous membrane. But in a few hours afterward, the same surface becomes thick and rough, resembling the aspect of most of the mucous surfaces. Instead of villi, however, the roughened surface is studded with numerous small red or fleshy granules, to which the term granulations has been applied by all surgeons. When the abscess has been prevented from closing by any cause for a long period, these sometimes become contracted and converted into a deep gristly, or cartilaginous pipe, called a fistula. But they are occasionally prevented from contracting to any extent, by the density of surrounding parts, and then they become covered by an epithelium, so as to resemble almost precisely the appearance and character of a mucous membrane. After the discharge of abscesses from the shafts of the long bones, especially the femur, it has repeatedly happened that a permanent cavity of considerable extent, has been left, to all appearance, lined by a perfect fac-simile of the lining membrane of the nostrils. In ordinary situations, however, the granulations continue to form within the cavity of every opened abscess, until they constitute a stratum of a few lines in thickness. They then contract spontaneously, and with sufficient force not only to extrude the purulent contents, but also to draw together, and close up the opposite sides of the cavity. After the cavity has been closed in this way, the leveled orifice, if it be larger, is called an ulcer; and a still further contraction of the superficial granulations will draw together the edges of the skin around it, frequently in radiating folds or wrinkles, so as to prevent all necessity of any evident degree of cicatrization. This remarkable contractility of the granulations was compared by John Hunter to the great property of muscular tissue, and perhaps still more appositely to the contractile power of a coagulum in fresh

drawn blood. From this comparison, was naturally derived the doctrine of Hunter, in regard to the formation of granulations. Instead of attributing them to a vegetative growth from the areolar tissue, as the French had done, or to a pullulating extension of the terminating branches of the subjacent vessels as Bell and others have concluded, he asserted that the granulations are produced by the exhalation of numerous small drops of the coagulating lymph, which become organized as soon as they coagulate, and establish vascular connection with the living surface. This process he supposed to be carried on until the granulations, multiplying among and over each other, constituted a layer sufficiently strong to assume the species of muscular contractility, to which we have just alluded. In what manner the preceding secretion of pus favors the development of this process, or why a continuance of the same secretion accompanies it throughout, until the abscess is entirely healed, he did not undertake to explain; nor have later investigators succeeded better in their efforts. We have to be content with the supposition that the secretion of pus relieves the distended vessels, and brings down the inflammatory actions to the point which favors granulation, and maintains it there until the termination of the whole process.

The difficulty in the way of our yielding an unconditional assent to this beautiful theory, consists in understanding how two such different compounds can be discharged from the same vessel, or from contiguous orifices of the same vessel, at one and the same time. Let us see whether we can be better satisfied with the lately adopted theory, which has been founded on the nucleated cell-doctrine of the microscopical physiologists.

In active inflammation, the proportion of fibrin, in the liquor sanguinis, is, as we have before stated, greatly increased: so, also, is that of the pale or exudation corpuscles. When these are exhaled in the earlier stages of the inflammation to the relief of the excitement, they become the immediate bond of union, as occurs in the healing of wounds by adhesion. But where they are thrown off from the vessels in a later and still more excited stage, as happens in suppuration, many of the exudation globules are seen under the microscope to be broken, or roughened externally, and granular in their interior texture. Then, the true pus globules are mingled with a large proportion of unaltered pale globules, and quantities of molecular fragments of coagulated fibrin floating in serum. After a short exposure to the air, the pus globules are said to enlarge

considerably by an absorption (endosmosis) of the surrounding watery portions of the serum, and then lose their rough or shriveled appearance, so as to predominate over the healthy or unaltered pale globules.* Now the refined cell-doctrine, as to the formation of granulations, consists in this—that a portion of these unaltered pale globules (which are supposed to be true nucleated cells), contract adhesions to the surface which exhales them, and become an immediate part of the living organization. The gradual superaddition of these upon each other, constitutes the granulations, while the other portions of the discharge continue to flow off in the form of pus. To prevent all doubt respecting the organized or organizable character of the pale globules, Professor Gerber, in his General Anatomy, has proved that they become, in a short time after their exudation, covered with a distinct pellicle or epithelium, so as to become genuine nucleated cells. This appearance of a new formation, however, can only be regarded as the incipient opacity of the exterior of a globule, which may at first have been a transparent epithelium.†

* Vogel suggests that the actual difference between pus and coagulated fibrin, consists in the fact that a different arrangement of its cells or globules renders it fluid, and allows of its escape from the parts which exhale it from the blood. "When pus arises from a fluid blastema," (uncoagulated fibrin,) "then its formation hinders the coagulation of the fluid. But when pus arises from a solid blastema, that blastema itself becomes dissolved and rendered fluid by the formation of the pus, and thus its external rejection becomes possible. The uses of the formation of pus to the organism, consists in this, that by its means exudations which were originally fluid, and would have become solid, are prevented from coagulating; and those already coagulated again become fluid, and thus the conditions requisite for their removal are effected." p. 153.

From this extract it is evident, that Vogel adopts the idea that pus is first exhaled from the vessels in the shape of pure coagulating lymph, or *liquor sanguinis;* and afterwards becomes changed into globular, or genuine pus, by a play of actions among the pale corpuscles within it. This process enables the inflamed parts to get rid of the superabundance of exhaled fibrin, which would otherwise accumulate in larger masses, after relieving the previous vascular engorgement. He also believes that the superabundant coagulated fibrin can be resolved down into fluid pus, by the formation of pus globules within it, and thus be wafted out from the system without the necessity of undergoing any other organic changes.

† This will be better understood when the reader recollects the similar phenomenon, in case of the retina, the texture of which is perfectly transparent before death, but becomes opake, like ground glass, in a few minutes after death.

Some of the late microscopical observers appear to have been ignorant of

As physiology and pathology have both made a leap since the establishment of the cell doctrine, it may not be altogether useless to institute a comparison between this new theory, more *in extenso*, and the long cherished hypothesis of Hunter. It will at least prove satisfactory to know how far the progress of microscopic discovery has gone towards superseding the splendid conceptions of the great investigator of life.

The parallel which we have drawn between the two favorite theories of granulation, may be extended through all the other phenomena of organization, both in health and disease. All that Hunter attributed to the formative power of this coagulating lymph of the blood, the microscopists now credit to the organizing influence of the cell globules, or nucleated cells of the same blood. He supposed that the blood, when effused among the living parts in very small quantities at a time, by virtue of its coagulating lymph, formed within itself its own vessels, which, by anastomosing with the capillary orifices of the surrounding parts, attracted the circulation into its interstices, and thus, by their actions, built up a new or additional organization. When the pure lymph is effused among the living parts, the same explanation of its organ-

this circumstance, and in consequence date the formation of the nucleated cells to the period which immediately follows the effusion of the blastema (fibrin) from the blood-vessels. Vogel evidently gives into this idea. He thinks the small granular molecules of the recently effused lymph (blastema) become the cytoblasts by first aggregating themselves together, and afterwards forming a capsule around from the nearest layer of fibrin. He thinks they are of a different protein nature from the capsule, because they do not dissolve or become transparent in acetic acid, as the capsules do. The acetic acid becomes an excellent test of the difference between the fibrinous and other protein compounds, when placed in the field of a microscope. It dissolves the fibrinous capsules, but coagulates the serum of the pus immediately on being brought into contact with it, and proves the change that has been effected in its composition, by the inherent vital powers of the blastema. The fluid part of the pus which is thus coagulated by the acid, and also by alum, is called pyin, and is very different from the true serum of the blood. The nuclei of the globules are never dissolved by acetic acid. Alkalies, however, dissolve them down into a slimy mucus. The formation of viscous and slimy matter in the bladder is explained in this way by Vogel. He supposed the disease of the bladder causes a secretion of pus, in combination with a large quantity of carbonate of ammonia. "The pus corpuscles undergo the same change in the bladder from the alkaline reaction of the fluid contained in it, as they do in the preceding pus tests; they become converted into a viscid mass, which physicians often mistake for mucus, thus losing sight altogether of its true signification."—p. 145.

ization was advanced by him, and maintained by all his followers. The capillary vessels were supposed to be formed spontaneously, within the mass of lymph, by its own inherent powers; and not by any extension, like a vegetative growth, of the surrounding vessels into its substance.*

It was a singular circumstance, that Sir Everard Home and Mr. Baer, in endeavoring to illustrate this doctrine of their great master, by proving how the vessels could be formed in fresh drawn blood under a microscope, should have almost anticipated the cell doctrine itself. They observed what they thought to be numerous small particles or bubbles of fixed air arranging themselves by a species of polarity in straight lines in a drop of fresh drawn blood. These appeared to form lateral openings into each other respectively, so as to constitute a series of capillary tubes, which, by opening a communication with surrounding vessels, might become

* It will be seen from the following extract from Vogel, John Hunter's views are still in the ascendant, even with the cell theorists of Germany. "Epigenesis of the blood and vessels," &c., page 165 of Vogel's work:—"Blood-vessels occur very frequently as pathological epigenesis in the restoration of lost parts, in granulations, in pseudo-membranes, in various hypertrophies, and in tumors. But our knowledge of the process of this development, is still defective, especially since the normal formation of the blood-vessels in the embryo is only imperfectly understood. It has been much disputed whether new vessels occur simply as a prolongation or further development of the old, or whether they may be formed independently, and without connection with the normal vessels. From a large number of observations, I believe myself justified in concluding that new vessels arise directly in the blastema, and only at a later period connect themselves with the previously existing normal vessels; indeed, that this is usually the case; further, that not only the vessels themselves, but also their contents, the blood, can be produced anew in this manner. In support of this formative process, the condition in the embryo may be adduced, where the blood, as well as the vessels, is formed from the common cytoblastema; it is supported also by direct observation. In the midst of newly formed (substance, inflammatory exudation, &c.), accumulations of blood corpuscles surrounded with more or less clearly indicated walls without any connection with the normal vessels are observed," &c. &c.

He appears to be somewhat dissatisfied with Schwann's theory of the formation of vessels by the lateral opening of cells into each other, in all cases at least. "The vessels whose pathological epigenesis I have observed, were all larger than capillary vessels; they were not formed from cells, as Schwann imagines to be the case with capillary vessels, neither were they formed in intercellular spaces; for the formation of blood always took place very early, before the formation of any other cells, and even before the formation of areolar tissue," &c. &c.

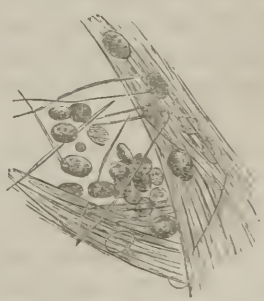
blood-vessels themselves. Now where is the substantial difference between these observations and those of later microscopists? Were not the exceedingly small bubbles of air the same things under the microscope that are now regarded as formative cells or exudation corpuscles? It makes no difference as to the proper conclusion, whether we call them pale globules, whose outer surface shortly becomes covered with an epithelium, or nucleated cells, or de-nucleated red corpuscles, as others have done. The analogy appears still stronger when we recollect that all the cell advocates assert that they can distinguish these little corpuscles arranging themselves in straight lines, and opening into each other side by side, so as to become resolved into tubes. One might suppose that after having so satisfactorily explained the formation of blood-vessels, the framers of either hypothesis should have remained tranquil. Almost everything in the body can be done by the vessels. They are powerful to do, as well as to suffer. The disciples of Hunter attributed a full share of all the manifestations of life and disease, to the actions of the blood-vessels; and surgeons have always concerned themselves with the same agents, almost to the exclusion of other parts of the whole economy. But the enthusiastic advocates of the nucleated cells were determined not to remain stationary during the progress of discovery. By their microscopical researches, they have ascertained that the cell-globules, when conglomerated together, can convert themselves into cellular tissue, by forming lateral openings into each other in every direction, or by elongating themselves into caudated points in opposite directions. After consolidation into elongated shapes, they convert themselves into filaments and lamellæ, which, in connection with the cellular interstices, form the general mould or matrix of the whole body.* Into the areola or meshes of this general text-work, the same all-creative cell-globules insinuate themselves, and form the parenchymatous substance of every elementary tissue of the entire organization. The epithelium of these little molecules, on being flattened down by desiccation on the surfaces, constitutes the cuticular covering of all the parts, including the hair and nails. Not content with this extensive physiological application of the cell doctrine, its advocates have made it answer a still greater number of problems in pathology. If these corpuscles exist in too great

* From several passages in Vogel's late work, it does not appear that he has abandoned Hunter's original view of the innate power of coagulating lymph to

a proportion, they must be productive of disease; if they are too scarce in the body, some equally distressing derangement occurs. If they are in any way badly or imperfectly constituted, or disorganized, some difficulty either in the functions or organization must be produced. From the use of the microscope, most of our recent authors appear to be able to detect in the form of globules floating in the blood the procreative elements of cancer, of fungoid tumors, and of scrofula. The entozoic and animalcular doctrines of the old surgeons have got quite out of vogue; and the nucleated and caudated cells are now placed in the chair of state by all our theorists. In the "Vestiges of Creation," we have been presented with a brilliant specimen of human genius in the way of extending this new doctrine to its ultimate limits. From the monad to a monarch everything is done by the action of the cells. The first cell-germ that was formed at the beginning of animated nature, has been reproducing itself by an infinity of multiples ever since; and to account for all the diversified living forms that ever have existed, we have only to conceive that this multiplication has been at so many periods successively arrested in its different stages of development. The first stoppage of the process of cell multiplication, would present an animal of a very low type of organization, possessed of a very small range of functions or powers. After this had gone on reproducing itself a few millions of times, until nature had got tired of its sameness, a leap would be made into a higher form of organization by the mere multiplication of the cells. By succes-

assume an organization, even independently of the cells. He gives a plate to illustrate the fact that numerous fibres or filaments can be seen crossing each other in every direction through a drop of recently effused and coagulated fibrin, among or between the interstices of which are to be distinguished numerous small pale corpuscles. "When examined under the microscope, they (the coagulated drops of lymph taken from an inflamed pleura), were found to consist of an indefinite fibrous mass, inclosing numerous pus corpuscles. Then fibres were observed crossing each other in every possible direction. On the addition of acetic acid the fibrous mass entirely disappeared, leaving nothing but the nuclei of the pus corpuscles. The whole substance, including the corpuscles, was entirely soluble in caustic potass."

Fig. 1.



sive repetitions of this process, it is supposed gradually to have happened that all the races of animated nature have been finally created. Faculty after faculty has been added to former faculties of life, according to the rise in the complications of structure; until at last the powers of reasoning have been attained in connection with the cell-germ fabrication of a brain. The fœtus *in utero* is supposed to undergo a similar course of successive developments, except that the multiplication of its formative cells is at no period arrested until the final perfection of its form has been attained. We must, then, according to the doctrine, have passed during the first six months of uterine existence through all the forms and assumed all the types of the whole of our Pre-Adamic ancestry, from the earliest monad up to the first man himself.

But enough of this folly. The cell-doctrine has already been carried too far for the sober sense of practical surgeons. Let it remain as a plaything for the fancy builders in science. Allow the microscopists to pursue their own researches, and work out their favorite results. "The tools to him who can handle them." We will follow the investigation of plain and tangible things, which we can see with our own eyes, and manage with the hands which God has given to us. It will add no strength to the certainty of our knowledge to decide whether a small particle of lymph be in the shape of a globule or a cyst before it becomes the medium of organization. The archetypes of Plato were just as important to the Baconian philosophy as such matters are to the progress of modern surgery. The chemists have found out that it is not necessary to ascertain the mathematical shapes of the integral molecules of matter, in order to study their laws of arrangement and combination. So we can go on with our pathological inquiries on the broad foundation laid down by Hunter, without stopping to question whether the three primitive monads were cubes, or tetrahedrons, or spheres.

CICATRIZATION.

The completion of the process of granulation is effected by the formation of a thin pellicle over the exposed surface, soon after it has reached the level of the skin. But this pellicle, although it commences at the edges of the skin all round, and gradually extends

towards the centre,* is not constituted by all the layers or textures of that structure. It is a mere epithelium or cuticular covering of the granulations somewhat analogous to the natural cuticle, and formed in the same way by a desiccation of the outer plastic exhalations. Here again the cell-doctrine has been brought into the correction of Hunter, but it merely substitutes the collapsed and dried epithelia of the cell-globules from the desiccated last layer of coagulating lymph. By this time the granulations have probably exhausted all their contractility, and the final diminution in the size of the cicatrix is no doubt effected by an interstitial absorption of the granulations below. In fact, all the granulations which have filled up and closed the abscess or ulcer, and afterwards formed a pellicle over themselves in continuity with the skin, may be considered as a part of the cicatrix. A diminution of their size by the action of the absorbents, will of course, contract the whole cicatrix and obliterate as completely as possible all traces of the original injury. But enough generally remains to be visible both at and below the skin, and as this is never perfectly like the surrounding parts, it was properly denominated by Dupuytren the tissue of cicatrix. On some parts of the surface, where the skin is loose and the parts below not confined, this substitute tissue is always small, excepting after the peculiar ulcers from burns. In rigid and unyielding parts of the skin, as the scalp, and over the resisting prominences of bones, it is invariably large and disfiguring in its appearance, because the last contraction from absorption of the granulations is opposed by those circumstances. The peculiar ulcerations after burns, and some of the caustics produce a tendency to form large and gristly cicatrices. So do also common incised wounds in some rare constitutions, especially about the neck and over the sternum. Such hard cicatrices sometimes grow into large fibro-cartilaginous tumors which require extirpation,† and they sometimes degenerate into

* The insular cicatrices which sometimes commence in the centre of large ulcers and form patches of epithelium, which gradually approach or coalesce with the cicatrix extending from the edges around, are only seen in superficial ulcerations of the skin after burns and syphiloid diseases. It is probable that in such cases the ulceration had never extended below the chorion over the whole surface, but left patches of the raw cutis vera studding the ulcer over which the insular cicatrices could easily form.

† The late Wm. Swift, Esq., of Bucks County, had three large tumors of this kind, which resulted from the increase of indurated scars of moxas, applied

malignant growths. In the same way, what Hunter called the termination of inflammation in induration, *i. e.*, an organization of the effused lymph, particularly in the glands, sometimes gives origin to indurated tumors or morbid structures. Cicatrices never possess so high a degree of vitality as the surrounding parts, and they of course more readily yield to pressure and the irritation of diseases. It is, therefore, no uncommon thing to see old sores and wounds reopened in morbid states of the system. In some few cases, it has happened that the uniting medium of long cured fractures of the bones has been reabsorbed under the irritating effects of injuries or diseases. The tissue of cicatrix is generally possessed of a much lower degree of sensibility than the neighboring parts, but it occasionally becomes sensitive and even painful. Perhaps this occurrence may arise from pressure upon the subjacent or surrounding nerves, but it may be caused by an extension of sensitive filaments through the substance of the cicatrix.*

some two years before, around one of his ears for the relief of deafness. These were extirpated by the knife, and one of them returned again and was a second time cut out. I might describe several others of a similar character, which have occurred in my practice. They have been called by Dr. Warren, and others, *kaloides*.

* About two years after the famous riot in Bristol, England, a young man was brought out from that city by Mr. Linn, of Fairmount, to act as engineer in his large steam engine works. The young man, however, proved unable to attend to the business for a long time, in consequence of a gristly scar of the size of a split walnut, just above the verge of the hair on one side of the forehead. This scar had originated from a severe contused wound he had received in the Bristol riot, from the blow of a brickbat. It had after some twelve or fifteen months from the cicatrization become very sensitive and painful on pressure, producing a severe neuralgia along the frontal nerve of that side, whenever it was touched, and finally inducing epileptic paroxysms. I excised this whole cicatrix down to the pericranium, by two transverse elliptical incisions across the course of the nerve, and he was immediately cured. He never had pain or epilepsy afterwards, and soon returned to his laborious employment. I could not satisfactorily make out the passage of the nerve through the tumor after it was extirpated, but several of my pupils thought they could discover traces of it running into the anterior margin and expanding into its substance. During the great nocturnal hurricane and storm at St. Thomas, about ten years ago, the family of Mr. Wolf, the banker there, were frightened out of their house by the loss of the roof and chimney. One of the daughters had lost her slippers, and on treading on a sharp piece of broken slate just fallen from the roof, she received a deep wound in the sole of her right foot, just in front of the *os calcis*. A long, broad, and deep transverse cicatrix resulted, which in a few months became so

HECTIC FEVER.

Unfortunately the higher stages of inflammation do not always terminate in granulation and cicatrization. Some organic difficulty has occurred in a bone or its ligaments, or among the tendons and fasciæ, all of which structures make slow progress in disease; and then the irritation and suppuration are often kept up for an indefinite period of time. The same influence is thereby exerted upon the system as happens in cases of protracted suppuration of the lungs and other vital organs. The constitution being incessantly harassed, becomes weak and irritable. It would appear, as Hunter imagined, that nature, finding herself unable to overcome the disease by open resistance, in the form of inflammatory fever, frets and worries herself into a hectic. The heart and arteries become exceedingly excitable, as is always manifested by a small, quick, and rapid pulse. The number of pulsations is, on the average, above one hundred and twenty a minute, being rarely below that point, and frequently as high as one hundred and thirty-six. At the same time it is weak and soft, except in the exacerbations, and then it is never firm under pressure. Although the pulse never comes down, as during the remissions of common fevers, still the general symptoms undergo frequent remissions and exacerbations. There is almost always a severer exacerbation in the middle of the day, and sometimes slighter ones at other periods of the day. The remissions are sometimes marked by shiverings and chilly sensations, but frequently only by a dryness or harshness of the skin. The paroxysms are indicated by a marked flush and heat on the cheeks, and a burning sensation in the palms. Often the whole surface then be-

tender and painful, that she could not place the sole of that foot upon the floor, or bear the slightest pressure upon the scar. Several incisions had been made into it in ineffectual researches for what was supposed to be a portion of the slate broken off and retained in the centre of the scar. The young lady was finally brought to me for treatment, and I excised the whole cicatrix down to the bottom between two deep curvilinear incisions. It reached down to the plantar fascia, and I had to cut through the substance of that fascia before I could get away the whole tumor. It proved to be a perfect gristle, and not a particle of broken slate could be found within its substance. The wound resulting from the operation healed in three weeks, without leaving an indurated scar, and the young lady appeared on the dancing floor in another month perfectly well and free from all inconvenience.

comes exceedingly dry and hot. Partial sweats mitigate the slighter paroxysms; but a copious and exhausting general sudorisis, called the night-sweat, appears during sleep at night, and rapidly emaciates the sufferer. The secretions are much less disturbed than in common fevers. Indeed, there is generally a free discharge of urine, often pale-colored, but depositing a copious lateritious sediment. The appetite is not always so much impaired as authors state. The patient sometimes eats freely digestible and delicate articles of food. The bowels may be at first costive, but they finally become relaxed, and often a dysenteric diarrhœa sets in, and carries off the patient. Intestinal ulceration is then found to have occurred in the form of patchy ulcers on the mucous membrane of the ileum and colon. This latter symptom, however, is more common in hectic fevers which accompany tuberculous ulceration of the lungs. Then the mucous membrane of the tongue and throat is also irritable, which condition is evidenced by a rawness and bright redness of the surface of the tongue, the natural villi having all disappeared. A white incrustation in the form of canker or diphtheritis generally appears before death in such cases, in patches over the glazed tongue, on the inside of the lips, the root of the mouth, and down the fauces. When the night-sweats are not regular or severe, and especially when the bowels are not affected, the tongue is not apt to be small and pointed, nor is its surface so clear, red, and polished, as in the more rapidly declining cases. Of course, there must be a considerable diversity of form in this disease, but no one can mistake its general characters. The hopeful condition of mind, however, is not so universal on the part of the patient, as most authors assert. It is, indeed, very common in pulmonary cases; but hectical patients from diseased bones and joints become exceedingly despondding, and are willing to submit to desperate measures for relief.

Although it has been generally admitted that Hunter discredited the absorption of pus as the cause of this disease, it appears that of late the old doctrine of a purulent contamination of the blood has been, to a large extent, revived. Even Mr. Liston, one of the very highest authorities in surgery, has adopted it; and many of the microscopists assert that they have detected pus globules in the blood of hectic patients. But it is unquestionably true, as Hunter declared, that this disease does occasionally occur in cases of protracted irritation in weak constitutions, independently of all suppuration. The long continued drainage of purulent matter, rather

than its absorption, would indeed appear to be productive of hectic, by exhausting the powers of the system, and rendering it irritable.

As to the treatment of the pulmonary forms of this disease, nothing can be said here which will add to the knowledge so generally distributed among the profession. In relation to the class of cases which comes under the management of the surgeon, it need only be observed that general depletion is always to be avoided. If the local irritation runs high, leeching, followed by proper counter-irritation, will always prove sufficient to allay the symptoms. The constitution must be supported by light and digestible food, chiefly of the farinaceous kind. Sometimes direct tonics will be required, and then animal broths, milk, and eggs are proper articles of food. But the great remedy, the great gift of God in such cases, is opium; which must always be given in such doses as to allay the general irritation, and procure a reasonable degree of sleep. As for the cure, it would be ridiculous to speak of anything but the removal of the exciting cause. The local disease must be either healed, or removed by a surgical operation; and it is truly delightful to see how immediately and perfectly the disease is overcome the moment we succeed in our attempts that way. It seems that our patients, laboring under the severest hectic fevers, bear the necessary operations for the removal of the exciting cause infinitely better than under any other circumstances. The explanation of this fact is, that we substitute a vastly inferior degree of irritation by the performance of an operation, for that which had before been acting upon the patient for a long period of time.

IRRITATIVE FEVER.

In intemperate and unhealthy constitutions, it often happens that inflammation after injuries is not preceded by the effusion of lymph into the cellular tissue, or accompanied by any reparatory efforts about the part, or in the system. The inflammation then assumes a morbid type, and extending by a rapid diffusion through the cellular substance, involves a large amount of parts. The constitution, of course, becomes intensely affected, and the disturbed and dangerous form of excitement called irritative fever, results. As we have already discussed this subject at some length under the head of constitutional irritation, accompanied by vascular excite-

ment, it will be unnecessary to draw a long parallel between this and hectic fever. It is of a much higher grade of diseased excitement, and runs its course altogether more rapidly and fatally. The vital powers sink very speedily, and the inflamed parts run into mortification, if the disease be not soon overcome by energetic treatment. The patient becomes exceedingly restless and agitated. The respiration is hurried and sighing; the pulse very rapid and jerking, but finally becomes soft and thrilling. There is great oppression at the epigastrium, tremors, and frequently delirium. The tongue trembles or quivers when protruded, and is covered with a thick dirty fur, with a brown stripe down the middle. It soon becomes very dry and encrusted, and the mouth and teeth are covered with sordes. Rigors frequently alternate with sweating, which is at first hot, and afterwards cold and dank. As we have said before, if, after proper evacuating and topical remedies, active stimulation is not resorted to, such patients rapidly sink into collapse and mortification. But it is unnecessary to repeat what has been so fully treated of under another head; and we will proceed, therefore, to speak of the last effect or stage of inflammation.

MORTIFICATION.

Although mortification does sometimes occur from other causes, still a majority of all the cases of it are produced by inflammation. At least inflammation is a collateral effect of the direct cause in most of those cases even which are supposed to result naturally and immediately from the injurious impression. Thus if a part be at once destroyed by a severe contusion, by intense cold, or heat, or by potential cauteries, the parts below and around will at the same time be excited into inflammatory reaction, which will, according to its rise and constitutional effects, modify the progress and results of the mortification. The same thing may be said of undue pressure, of disease, or obstruction of the blood-vessels, and of most other causes of mortification. It was right, therefore, to classify this condition, as Hunter and others have done, among the terminations of inflammation, although some cases occasionally occur which have no necessary connection with that process.

The division of mortification into the two different states or stages of gangrene and sphacelus, is of greater importance than some sur-

geons appear to have imagined. The first of these, *gangrene*, is only the commencing stage of the process, during which inflammation, and, of course, life, still exists in some of the affected textures so as to maintain the sensibility and heat of the whole. The parts have become excessively swollen from infiltration, and, perhaps, collections of matter, and the surface appears dusky and mottled, or livid in streaks, and covered, in short, with black or dark bloody vesications.* A peculiarly offensive or fetid odor is exhaled; and, perhaps, even an emphysematous crackling begins to be felt under the skin, from an internal distention of the cells with putrefactive gases. But the animal heat has not yet departed; from which circumstance some writers have denominated this stage "hot mortification." The acute pains of the preceding stage of active inflammation may have subsided, but still there is sensibility in some of the affected parts, and a possibility of saving the mass. If the disease does not extend over a large portion of a limb, and if the constitutional forces are not alarmingly prostrated, it is still possible, after removing the general causes of irritation and reinvigorating the energies of the vital organs by proper cordials and nourishment, to resort to such local treatment as may save the affected member. We often see this done in bad fractures, and even in compound dislocations, by readjusting or better regulating the confining apparatus, by making the requisite incisions for discharging the collections of matter and infiltrated fluids which have been keeping up internal strangulations, and by afterwards applying proper soothing and antiseptic medicaments. Patches of the dark and vesicated skin with the subjacent cellular tissue, and, perhaps, entire portions of the extreme members of the limb, as one or more phalanges of the toes or fingers, may slough away, and still healthy actions be restored in all the remaining textures. By steadily supporting the system with tonics, and cordials, and digestible nutriment, suppuration will be instituted around all the sloughy parts, which will be

* After severe injuries of the extremities, such as fractures, dislocations, or bruises, it is no uncommon thing to meet with blood-blisters and green or yellow stains of the skin, especially between the points or spaces where the bandages have made unequal pressure. These should not be confounded with the dark phlyctenæ of gangrene, nor should they be left totally unattended to by the surgeon. It is better to puncture them with a lancet, and dress them with simple or Turner's cerate, to prevent them from being converted into excoriations.

followed by granulation, cicatrization, and a perfect usefulness of the limb. Large portions of the soft parts on the trunk, as about the nates, hips, and shoulders, after malignant erysipelas and anthrax, may be thrown off in the same way with final safety to the constitution.

The very approach of mortification naturally involves the idea of a sinking of the vital forces, and practitioners, therefore, are too much in the habit of universally prescribing cordials and tonics to avert its progress.* Care should be taken, however, in all cases of inflammatory excitement, not to resort to such remedies too soon. The period of prostration or sinking must, in some cases, have actually arrived, before stimuli can be substituted for the antiphlogistics which have been employed for subduing the inflammation and fever. In many cases which occur in young and vigorous subjects, after severe injuries, the antiphlogistic treatment is required throughout, in a less active form, to be sure, in the latter stages, but still to a sufficient extent to subdue the excitement. It is only when the powers of the system are beginning to give way in such cases that stimuli are required, and that condition is indicated by tremors, coldness, and clamminess of the surface, a fluttering or small and thready pulse, anxiety, and weak, hurried respiration. If the stimulating plan be too long deferred under these circumstances, delirium will steadily set in with hiccuping, vomiting, and, finally, a fatal coma. The best plan is to commence with the mild stimuli and nourishment, such as carbonate of ammonia, with wine

* Mr. Liston states that "inflammatory action is seldom so intense as to terminate in death of the part, unless the power of that part has been diminished by previous local or constitutional disease, or by injury, and the inflammation preceding gangrene is all along attended by symptoms of so well marked debility, both local and general, that it is frequently designated the Inflammatio Debilis." John Hunter's pithy statement expresses the same idea still more clearly: "*Mortification arises from action without strength to maintain it.*" But notwithstanding these great authorities, we cannot but perceive that mortification does sometimes occur in the most robust and healthy constitutions, and that, too, in parts which have not been excessively injured. In hot weather, when the inflammatory reactions have not been kept down by proper evacuants, the compound fractures and dislocations of our youngest and most vigorous patients do sometimes become gangrenous. Excessive actions can certainly destroy the vitality of healthy parts in healthy constitutions. We must admit, however, that such cases are altogether more amenable to treatment; for we can generally arrest the progress of gangrene in them by proper management.

whey, and arrow-root, or tapioca, and to rise gradually afterwards in the activity of the remedies as the irritability of the system declines. In a short time alcoholic preparations can be borne, in combination with quinine and other preparations of bark, and, finally, malt liquors with strong animal broths, and even small quantities of solid food. During all this course, however, opium should never be neglected when it is required to allay nervous irritation and procure the requisite amount of sleep.

But topical treatment becomes a matter of immense importance in the arresting of gangrene. In by far the majority of cases mortification from inflammation of every kind is accompanied, if not produced, by internal causes of strangulation of the affected tissues. Common infiltration under firm parts, especially underneath tense fasciæ, will of itself excite a local irritation sufficient to destroy vitality. Collections of purulent matter, however, among the deep-seated parts is the most irritating and common cause of this important result. Incisions should therefore be made extensive and deep enough not only to divide the strong subcutaneous and muscular fasciæ, but also to penetrate every collection of matter which may be situated among the parts. It is sometimes necessary to lay open even the periosteum for this purpose, especially in the neighborhood of injured joints. But unnecessary incisions should never be made among the living tissues. It will generally be easy to select the mortifying portions and to penetrate through them with sufficient depth and freedom. These incisions should immediately be followed by warm fomentations and emollient applications or poultices,* under

* During the period of my pupilage it was not the practice to make incisions in any case of gangrene, either in the private or hospital practice of Drs. Physick and Dorsey. They always applied blisters over the upper portions of the mortifying part, under the idea that they could thereby rouse the energies of the vessels and nerves so as to resist the progress of the disease. Their favorite application was a carrot or flaxseed poultice with charcoal dusted over the putrid surfaces. I must say, however, that I never saw a case of gangrene arrested in those days except by the line of demarkation and entire loss of the limb. Since the introduction of the method of treatment by incisions I have seen several cases saved with only small ulcerations resulting from superficial sloughs, in spots or patches. Under the head of compound dislocations and fractures, I shall have occasion to detail several remarkable cases of this sort. The unfortunate Bowie, who was killed at the Alamo, was once a patient of mine, when he told me of a case in point. After a battle with the Camanches, one of his companions, who had been shot through one of his legs, was left by his companions to die of a mortification of the wounded limb. Bowie took pity

which, if the constitutional treatment acts favorably, healthy suppuration will soon be promoted to the discharge of the sloughs and the reparation of the consequent breaches of structure. The use of stimulating poultices made of port wine and barks, or of antiseptic ones made of fermenting materials which generate carbonic acid gas afford but little advantage in practice. They are too cumbersome and filthy, and require too frequent changes for the comfort of the patient. Whenever antiseptics are required to prevent either the exhalation or absorption of putrefactive odors and juices, dusting the powder of charcoal and bark or orris root over the parts, and covering the whole with some mild ointment, spread on linen or cotton rags, will prove very efficient and convenient. If the surface is too dry for such absorbent applications, and requires emollient as well as antiseptic and stimulating remedies, nothing can be better than the basilicon ointment mixed with turpentine and creasote and spread on patent lint. Dossils of lint smeared with this combination can be laid into the fissures made by the incisions, and large masses or layers of the same can be wrapped around all the parts. Sometimes rags with an acidulated lotion of nitric acid and cold water prove to be an excellent application. In cases attended with intolerable fetor a few drops of pyroligneous acid or of chloride of soda, or even pure creasote may occasionally be poured into the fissures before making these applications.

As the gangrenous disposition prostrates the system not only by its deadening influence upon the nerves, but also by its contamination of the blood, great care should be taken to obviate all internal as well as external causes of putrescence. For this purpose alum and the mineral acids are given by some surgeons in large doses; also fresh yeast, naphtha, and divers aromatic and tonic decoctions. Emulsions of spirits of turpentine or creasote are in many cases preferable to either of these, especially as they rouse the energies of the mucous membrane and of the whole nervous system at the same time that they act potentially as antiseptics. One of the best means

on the poor fellow, and went back to watch him for a day or two. Although the limb was swollen and livid, and covered with blood-blisters and crackled on handling, he undertook to carry him to a neighboring stream of water; but the moment he lifted him from the ground something gave way in the bad leg, a large quantity of matter gushed out through the bullet hole, and the swelling and other appearances of gangrene disappeared. The man soon after recovered and got back to his friends.

of checking putrescency in the system as well as in the mortifying part, is to insure free ventilation of the room. The retention of foul saburræ in the bowels should, moreover, be avoided by the repeated use of laxative doses of aloes or other mild eccoprotics which will not excite watery discharges. In some cases the nervous prostration which attends gangrene causes a paralysis of the bladder. This point should always be attended to, and catheterism resorted to if necessary. The escape of urine by regorgement or overflow should never be mistaken under these circumstances for a natural discharge, for a distension of this viscus will speedily induce the fatal coma.

SPHACELUS, OR COLD MORTIFICATION.

If in despite of all these measures, or before any of them have been resorted to, the part becomes entirely cold and insensible, and the diversified mixture of yellow, green and blue colors is merged into one deep hue of black, the stage of gangrene has been passed over, and the entire part is in a state of sphacelus. No change, however, will be required in the constitutional treatment, and but very little in the topical. It will only be necessary to remove the moist and emollient applications from the dead part, and to keep down the temperature of it as much as possible, without inconveniencing the living structures above, so as to retard putrefaction. In general, we may say, that in humid or moist sphacelus, the best antiseptic is abundance of charcoal powder, confined around the dead part in a box or bag, which will absorb the fœtid juices, as well as odors. At the same time some emollient or corrective applications, in the form of a poultice or an ointment, can be laid over the junction of the dead and living parts, so as to promote the process of a separation of them by ulceration. This separation is established by what is called the line of demarkation, and if it appears we are always enabled to decide that it is still possible to save the life of the patient. It is effected by the living parts above, reacting under our invigorating treatment, and establishing a red inflammatory border, just at the edge of the discolored surface above. Under this, at first a linear blister soon forms, underneath which a deep tissue begins to appear exactly as if a sharp knife had been carried all around, between the dead and living borders. This is evidently produced, as John Hunter describes it, by the ulcerative

action of the absorbents,* and it is afterwards deepened by it all around down to the bones. The skin and cellular substance, is divided first, the muscles and blood-vessels next, the nerves, tendons, and fascia last, until finally after a long resistance the very bones themselves yield to the same process; and thus a natural amputation may be performed by the spontaneous efforts of the living parts. We sometimes take advantage of this process in such weak and exhausted, or elderly constitutions, as we are afraid to subject to the shock and hemorrhage of an operation, performed through the substance of the living parts above. By inserting the edges of a linen retractor, into the fissure which constitutes the line of demarkation, we are enabled to draw upwards the living parts, while a saw divides the bone as high up as its exposure permits.† When this line occurs at a joint, or at the seat of a fracture, we can still more easily relieve the patient by dividing the tendons or ligaments alone, and thus relieve the patient from his offensive incumbrance. The objection to this sort of amputation, in the majority of cases is, that it does not make so good and useful a stump as the ordinary amputation, when skillfully performed. But many operators—and every bungler in this country presumes to amputate—make out much worse in this respect than nature. In some cases, however, as we shall see under the head of amputation, we are compelled to amputate a mortifying limb, before the line of demarkation

* What we have admitted, however, under the head of ulceration, should be reasserted here. It is doubtful whether the process of inflammatory softening, and disintegration of the sound parts, in contact with the dead, does not contribute its full proportion to the establishing of the line of separation. Both venous and lymphatic absorption may afford some aid, but certainly inflammatory reaction is always present.

† As the relaxation which effects the line of demarkation almost always extends obliquely downwards, under the mortification, (the superficial parts being more extensively sphacelated than the deeper,) it will generally be necessary to lay open the dead parts somewhat, and expose the bone more freely. Then with a bistoury we can loosen the muscles above, from the bone or bones, so as to draw the parts higher up by the retractor, and thus prevent the formation of a too conical stump. There will be no danger of any considerable hemorrhage from this procedure, because all the larger vessels are closed in the immediate vicinity of the mortified part. I have not lost a patient by this mode of amputation; whereas I am confident I have seen several destroyed by a neglect of it. Those young surgeons who pant for opportunities to perform the coarser operation of cutting through the sound parts, will sooner or later have occasion to repent of their barbarity.

is established. When we perform this operation in hopeless cases of gangrene from comminuted compound fracture, or dislocations, we remove the cause* of irritation along with the diseased part itself.

When mortification of the extremities results from frost bites, this occurrence does not happen from the direct operation of cold. Extreme parts may even be stiffened by congelation, and still their vitality be preserved by proper treatment. It is a well known phenomenon, that fish and cold-blooded reptiles may be frozen as hard as ice, and afterwards resuscitated by a very gradual thawing under water of a low temperature. In the same way hot-blooded animals can be revived after almost complete asphyxia from cold without any dangerous affection of the system, or loss of vitality in their members. The successful treatment always consists in allowing only a slow and gradual restoration of heat and vital excitement. The great doctrine of John Brown furnishes the true explanation of all these facts. During a suspension of the influence of heat upon the system, and upon any of its parts, the principle of excitability accumulates in the same manner that it does after the subduction of all other stimuli. The same degree of temperature, therefore, which before the long continued operation of cold had proved perfectly comfortable and healthful, becomes afterwards the cause of intense and painful excitement. An irritative and dangerous form of inflammation will then be produced in the frosted parts, and a morbid excitement will also be developed in the system. If the system withstands the violence of reaction, and finally recovers its

* Mr. Liston has made a just observation upon the importance of a removal of the cause of mortification: "In the treatment of mortification, no one would think of using any means, local or general, so long as the cause remained; and it, therefore, must in the first place be removed, otherwise the mischief may become irreparable; thus a stricture must be divided, irritating fluids evacuated, foreign bodies extracted, &c." In very oblique, or comminuted fractures, the spiculæ and sharp extremities of the bones are sometimes driven into the muscles and aponeuroses, so that they act as unremovable causes of gangrene, except under early amputation. It is only after sphacelation that they cease to operate as causes.

Mr. Liston gives a very interesting case of the servant girl who fell from a window into an area fifteen feet deep, and broke both bones of one of her forearms. In five days after, having suffered severe pains and inflammation, gangrene commenced, and was rapidly extending up the humerus. Mr. Liston immediately amputated at the shoulder joint. The delirium and other symptoms of constitutional irritation at once subsided, and the patient walked about in a few days.

tranquillity and health, it is not always so with the members. Some one or more of them, especially the lower extremities, are exceedingly liable to irritable and morbid inflammations, which are speedily followed by vesications, and very troublesome relaxations, if not gangrene. Even when the dangers of gangrene are obviated by the most skillful treatment, irritable and chronic inflammations in the form of chilblains, are apt to remain and trouble the patient for years afterwards.

If gangrene from frost has once been suffered to commence, it proves more difficult of management than when it proceeds from almost any other cause. Nothing but soothing and corrective applications of a low temperature can possibly avail, and although the powers of the system must be sustained by nutritious broths and gruels, great care should be taken to keep the actions down to a moderate standard. The best plan is to cover the parts with thin and soft linen, spread with mild cerate impregnated with creasote, and to keep down the temperature constantly for a long period to the standard of comfort, by cloths wrung out of iced-water. Of course anodynes should be given to relieve pain and produce composure, but active stimulation should always be avoided. When sphacelation has arrived, nothing more can be done than to check and obviate the effects of putrefaction, and support the powers of the system. In most cases, after the formation of the line of demarkation, the system will have recovered sufficient power to undergo the ordinary amputation. In very old or intemperate persons, however, it will be safest to assist the natural effort at amputation, at the situation of the line of demarkation, as has been above described. At all events it must be considered as an axiom in surgery, not to amputate a limb which has been mortified from the influence of cold until after the line of separation has been formed. The morbid cause has operated too generally upon the system to allow of its complete removal by an operation. The incised parts will be too irritable at an earlier stage of frost-bite to undergo a full amputation, and the stump itself will be apt to mortify. The modes of treatment at present in use will, moreover, generally succeed in diminishing the evil effects of putrefaction, and supporting the constitution until the line has been fairly established.*

* While I was in the act of writing the above sentence, Col. K—— S—— called upon me to request a visit to one of his family. This put me in mind of a case of mortification from cold, which occurred many winters ago on his

In regard to mortification from burns very little need be stated under the present head. The peculiar and irritative inflammation which attends it, generally extends so far above the borders of the slough as to prevent an early amputation, and the treatment can be so managed as to protract the case until the line of separation has proved quite effectual. By that time it will sometimes be discovered that the apparent mortification of an entire portion of a member is only a superficial slough of the integuments and cellular substance below. A parallel observation will be made of a similar condition of superficial gangrene, after malignant erysipelas. The peculiarities of treatment for burns will be fully considered under that head of our inquiries.

The distinction made by some writers between moist and dry gangrene, is of no great practical importance. The majority of cases which arise from inflammation are moist because of the preceding infiltration of fluids into the interstices, and the continuance of the circulation through them until perfect sphacelus is produced. But the converse is not true in every sense, for cases of dry gan-

mother's estate, three miles out of town, and which will serve to illustrate two of the points stated in the text. With the Colonel's correcting of my memory, I will state the facts. A colored boy about 17 years old, was sent into the city on a cold winter's night, with a wagon. Some circumstance prevented him from getting home before morning, and he slept out in the wagon all night. He walked home next morning, but felt numb and torpid in his legs. He was carefully nursed by the kitchen fire, and stimulated with hot food and drinks. The consequence was a violent pain and inflammation in his legs, which terminated in mortification of both feet. He was soon after sent to one of the hospitals, where both legs were amputated, and he died in less than a week after admission. When the good lady of the house first stated the case to me, I told her that she ought to have put the boy into the barn, and kept him for a while in the cold straw, while she fed him with light gruels and teas. By suddenly warming him before the hot fire, and cramming him with food, she had killed his feet; and then by sending him to one of the hospitals to get his legs so soon cut off, she had been the means of destroying his life. As this was not said harshly, it was taken kindly as a piece of useful information, and I repeat it here in hopes that it may do as much good to some of my readers. I ought to add, that every case I have witnessed of deferred amputation for frost-bite, has done well, while all those which have been performed before the line of demarkation was deeply established, died, or presented a sloughy stump. I have known of three patients on whom double amputations were early performed. Two of these died outright, and the third I attended in the Philadelphia Alms House in 1822, for sloughy stumps and exfoliating tibias, left on my hands by the operations of one of my predecessors.

grene which do not originate from inflammation, may easily and do often produce it, by exciting an irritation upon the nearest living parts. Even some of the cases which begin in inflammation are gradually desiccated as they progress, especially if they are exposed to evaporation in a dry atmosphere, or to the influence of absorbents. The most important point of view in which they can be distinguished is, that whilst moist gangrene is a highly acute disease in all its characters, and makes a rapid progress, the dry is altogether more chronic in its course and duration, and patients can be preserved under it for a much greater length of time, although suffering the inconvenience of a mummefied and burdensome appendage. Mr. Travers, indeed, has denominated the latter form of the disease *chronic gangrene*. But it must not be inferred that it is always dry. It is often met with on the instep and sole of the foot, in a humid and puffy state, from the infiltration of putrescent fluids; although when confined to the toes alone it is generally dry and mummy-like in its appearance. Although this species is often called senile gangrene (*gangrena senilis*), from its attacking more frequently the feet and sometimes the hands of old people, it is by no means peculiar to advanced age. It has occurred in persons of all ages, even in the period of infancy. Any cause which greatly and permanently depresses the energies of the nervous and vascular systems, especially in the extremities, may produce this kind of sphacelus. Prostration from protracted typhus has terminated in it; so also has confinement to unwholesome and debilitating articles of food. The influence of ergot in the sour and mouldy rye bread, on which the lower orders of people in some parts of Germany and France are fed, can be explained in this way. Obstruction of the arteries from any cause, and injuries of the large nerves, may also produce it. Organic diseases of the heart in adults, and such malformations in infants as produce blue skins and cold extremities,* sometimes cause the same

* I once saw a child seven years old, near Middletown, in Delaware, who had been represented to me as having lost both legs in a singular manner. I visited the case as I passed by, and found that dry gangrene had appeared the year before in one foot, and a spontaneous detachment of it by nature's amputation had taken place at the ankle. The other foot and ankle had, in the meantime, undergone the same disease, and a line of demarkation above the malleoli on that side. On inquiry, I ascertained that the child had been feeble and delicate and liable to "blue and cold turns" from birth. That was, no doubt, a case of congenital malformation of the heart, and no other cause could be suspected to have produced the disease.

affection. Starvation, depression of spirits, and losses of blood have all been influential in effecting the same result. But old persons of a gouty habit, and especially those afflicted with ossification of the arteries, are proverbially liable to this kind of mortification. Although slight injuries and inflammations in their toes and fingers generally give origin to it, still exciting causes are by no means necessary in such persons. A sensation of numbness or torpor, accompanied by an occasional prickling or neuralgia pains, and cramps of the muscles above, usually precedes the development of dry sphacelus, in the last extremities of one of the members, and symptoms of constitutional disturbance are also in most instances complained of. The patient has not been able to sleep quietly for some days; he has been anxious and restless, with loss of appetite and a sense of distress at the epigastrium. Chills or shiverings sometimes supervene, and a painful sensation of coldness and debility is complained of in the extremities. If the sphacelation appears before reaction, as it sometimes does, it is apt to make considerable progress before the patient or surgeon is made aware of it. Instead of a small black spot, as authors describe its beginning, a whole toe, and sometimes two or more will be found dead and shrivelled. This form is the real dry gangrene, and it may progress to a considerable extent before any degree of reaction occurs. But in the majority of cases an erysipelatous, or gouty redness, attended with a great deal of pain and sensation of burning occurs in the part before it mortifies. Indeed vesication occurs previously, and often the whole foot swells as in genuine gout. This is especially apt to be the case when the disease is excited by an injury, as from cutting the nails or corns, or wearing tight shoes, or exposing the part to sudden vicissitudes of temperature. The gangrene in these cases is sure to be humid, except at the very points or last phalanges of the toes, which may shrivel and become hard. The nails, however, speedily fall off, and leave the parts below and above moist and putrid. Most cases of this disease are excessively painful, especially when the gouty or inflammatory kind of reaction accompanies it. Although the torpid and uninflamed cases present nothing but a prickling numbness and slight neuralgic feelings which anodynes and stimulants can readily allay; those arising from, or complicated with, irritative inflammation of the parts above generally excite more distressing and excruciating pains than any other disease in nature. The effects of large doses of opium, when prescribed by the celebrated Pott in such cases, were so ad-

mirable in the way of overcoming the pain, and checking the progress of the disease, that it was denominated all over England, at one period, Pott's gangrene. Before the publication of Pott's treatise on this subject, bark and wine, and the most nutritious articles of food had been universally resorted to, for the cure of senile gangrene. He revolutionized the practice in a great measure, and ever since large and frequently repeated doses of opium with farinaceous food, and no stimulation, have been chiefly depended upon. No slight difference of opinion, however, has been expressed by respectable surgeons in regard to the propriety of that change. Professor Gibson, of the University of Pennsylvania, in his work on surgery, totally dissents from the opium treatment of Pott; and several other practitioners have asserted that they found no benefit from anodynes in any shape. Sweeping assertions, however, should not be allowed too much weight in such a case. Senile gangrene is not a specific disease, possessed of only a single form or character. As we have seen there are strikingly different forms, in the milder one of which very light anodynes will prove sufficient to relieve, while the large doses of Pott would be likely to overwhelm the enfeebled system.* In that form, moderate stimuli, nutritious food, and tonics, with warm and stimulating topical applications will prove the appropriate treatment. But in the excessively painful and

* To illustrate this form of senile gangrene, I will state the case of the late D. C., Esq., one of our most respectable merchants. He was about seventy years old, and of the most regular and temperate habits. In former years he had occasionally been subject to gouty attacks, but by regular living he had kept the disease under tolerable subjection. Although a wine importer, he had never indulged in more than two or three glasses of sound Madeira after dinner. In February, 1842, after some slight derangement of his general health, he sent for my brother, Dr. Samuel McClellan, to consult him for an uneasy feeling in one of his feet. On a careful inspection, the physician discovered, for the first time, a black spot of the size of a pea on the first joint of the little toe. There was an extensive ossification of his arteries, especially in the lower extremities. But very little pain was ever complained of, although the mortification progressed steadily, until, finally, it destroyed the little toe and the next one adjoining. These became perfectly dry and shrivelled, and the nails did not fall off. The old gentleman kept up about his room until during the last three weeks, when his instep swelled and became red and vesicated. He was then so weak as to be confined to his bed. The vesicles became livid, but the foot did not sphacelate. His strength, and, finally, his appetite declined, and he expired about the latter end of April, without requiring any particular treatment, either anodyne or tonic. No local applications were needed, except soft rags spread with simple cerate.

irritable cases of this gangrene, the system must acquire a tolerance of opium, under which not only large quantities can be given, but for which they must be given, in order to afford relief. The mode of administration of the remedy, has no doubt influenced its effects to a considerable extent. Those who have opposed it most stoutly, have administered it in a fluid form, which always favors absorption into the circulation. The consequence naturally must have arisen, that the head was affected with coma, and the system with narcotism before the curative influence of the remedy could be exerted upon the nervous and vascular systems. In the shape of dry hard pills of solid opium, it becomes almost a different medicine; not being readily dissolved, it passes down below the stomach and applies itself to the nervous extremities over the whole mucous membrane of the bowels, and thus produces a composing effect upon the solids, with an inferior degree of narcotism exerted upon the brain and circulation. Opium, however, is not the only remedy which can relieve the pains of dry gangrene. Large doses of hyoscyamus, of belladonna or stramonium, either alone or in combination with camphor, will often relieve them. In some cases, the carminative and pungent stimulants will do better than any of the narcotics. Large doses of turpentine, of naphtha, or of creasote will often relieve miraculously after every other internal remedy has failed. By affording the requisite degree of diffusible stimulation to the nervous system, and rousing up the energies of the enfeebled capillaries, they appear to answer every indication in certain cases, which ought to be characterized for the benefit of practitioners. The cases to which allusion is here now made, all present the peculiar phenomenon of the patient holding the affected member in a depending position. No matter how bad and inflamed the parts may be, the limb will be held downwards, and frequently it will be impossible to prevent the sufferer from exposing it to the full blaze of a fire.* It

* Out of several cases in my practice, I have selected these for illustration. Some years ago I was called to see the late R—— C——, Esq., near Middletown, in Delaware. He was an old gentleman, about sixty-five years old, who had been a large farmer and a hearty liver. I found him sitting before a hot fire on a low bed, leaning on his knees and holding on to both his feet, which rested on the floor. He was howling and shrieking with pains which no anodyne or topical remedy could relieve. It was impossible to keep him on the bed for a moment, and it had been so for nearly three weeks since his first attack. On examining his feet I found them excessively irritable and flushed over the insteps from the toes to the ankle. One of the toes on one of the feet, and two on

would appear as if the obstructed state of the arteries leading to the affected member, or their impaired condition of vitality prevented the free access of blood to the limb, and, therefore, required the aid

the other, had become black and dry at the tips, and dark vesications had began to form around their roots. His tongue was dry and furred, his skin hot, and his stomach oppressed and nauseated. His pulse could hardly be distinguished at the wrist or the ankle, for his arteries there were partially ossified. His femoral arteries were ossified also; and I had to ascertain the condition of the circulating powers from the temporals and carotids. His pulse, in that way distinguished, proved to be quick and irritable, but not strong. I found his bowels had been very torpid for some weeks, and no ordinary cathartics had proved sufficient. The evacuations procured by medicines had all been watery or scanty and tarry. I, therefore, recommended a twenty grain dose of calomel, in combination with twelve grains of rhubarb, which was afterwards repeated, and followed by oil and turpentine. Large evacuations of consistent fæces followed, to the great relief of the febrile excitement. I then blackened the whole feet, toes, and ankles, by repeated applications of nitrate of silver in solution (twenty grains to the ounce), and enveloped the affected toes in basilicon mixed with creasote. The result was a great and immediate relief of the pains, and a marked subsidence of the general irritation. Opiates afterwards composed him to a reasonable extent, so that he could sleep in a horizontal posture and enjoy a tolerable protraction of his existence. Although he continued to suffer the dependent position of his legs in the daytime, still, under composure from opium, he could lie in bed over night, and thus he dragged out his existence a few months longer, until he died without amputation.

F—— K——, Esq., a very respectable old gentleman, of sixty-seven years, living on Washington Square, had been for some weeks under the care of Dr. Physick, for a dry gangrene, of spontaneous occurrence, in two of the toes of the left foot. He could not be induced to obey the Doctor's directions as to laying in bed with his foot raised on a pillow, but would sit up on an easy chair with his feet down on a low stool before the fire. He had in vain tried numerous repetitions of Dr. Physick's then favorite remedy, fumigations of the foot with carbonate of ammonia sprinkled on a hot shovel, alternated with carrot poultices and other soothing applications. In the mean time the natural bone-setter was sent for, and Dr. Physick retired from the case. The bone-setter, of course, pronounced the mortified toes, which had always been deformed from contracted tendons, to be dislocated, and left some rattlesnake's oil and skunk's grease to relax the ligaments before making his promised efforts at reduction. The patient soon got tired of that kind of surgery and sent for me. I found his arteries extensively ossified, and his feet very irritable and painful, with an erysipelatous blush over the insteps. The access of blood to his legs was favored by repeated vapor baths locally applied, and also by stimulating embrocations. In a few days the collateral circulation was fully established, the capillaries of the feet became tranquil, and the gangrene was arrested at the roots of the affected toes. He removed afterwards to the north, and lived several months without amputation having been performed.

of gravity and of warmth to promote the necessary access of blood into the capillaries. The minuter vessels and their controlling nerves being called on to make increased efforts to pump, as it were, the circulation through enfeebled arteries, necessarily generate the accompanying pain and irritative inflammation. The increased pressure of the column of blood from above, under the force of gravity, relieves them from the necessity of making such extraordinary efforts, comforts the irritated and exhausted nerves, and explains the advantages of a dependent position of the limb. The influence of warmth in some cases, and of internal carminative and diffusible stimuli, can also be satisfactorily explained on the same principle.

There is considerable difficulty to be met with, however, in many cases, in adapting proper local treatment to this peculiar condition. The warm and emollient applications, which are at first necessary to appease the irritation and promote the access of blood, are apt to induce too great tumefaction and infiltration. The mortification will frequently be found to increase rapidly under the very stimulating and comforting applications which the patient has at first been most delighted with. The dependent position of the limb may also, after awhile, result in too great a distention of the exhausted capillaries, and hasten on the gangrene which at first it had appeared to relieve. By this period, no doubt, some degree of collateral circulation has been established around the obstructed or diseased portion of the arteries above, and thus an altered condition of things produces a change in the phenomena of the case, and requires a corresponding modification of the treatment. The warm and relaxing poultices and fomentations have to be exchanged for cooling and astringent applications, the patient has to be placed on a sofa, or in bed, and the limb elevated at least to a horizontal position. Great advantage will, after this period, be derived from the support of equable and moderate bandaging around the toes, foot, and ankle, by which tone will be conferred on the extreme vessels and nerves, while at the same time the re-absorption of the infiltrated fluids will be promoted. The irritability of the inflamed surface will, however, prevent the possibility of resorting to this favorite measure of surgeons, unless it be previously relieved by proper sedative applications. Nothing is so beneficial in this respect as the recently introduced method of blackening the cuticle around the whole extremity, by repeated applications of lunar caustic. It should not be applied in so strong a solution as to ex-

cite vesication, although the late Dr. Physick was a zealous advocate of blistering in such cases. As has before been explained, a weak application of the nitrate of silver repeatedly applied, will speedily deaden the irritability of an inflamed surface, contract the subjacent blood-vessels, and produce a blackening and shriveling of the outer integument. After this effect has been produced, bandaging can be resorted to with great advantage, exactly as in cases of gouty paroxysms in the feet.

After the complete arrest of senile gangrene, amputation may be completed at the line of separation, in most cases, with great benefit and comfort to the patient, but it can never be performed with safety through the sound parts above. The results of the trials made in the common way in this country, have been almost uniformly unsuccessful. If the patient stands under the shock of the operation, he almost invariably sinks in a few days or weeks from exhaustion, and that, too, without cicatrization of the stump.*

* It is perplexing to read the opinions of different authors upon this point. Some of them speak of amputation as a familiar and successful thing; while others modestly state particular cases only in favor of it. I believe the majority, however, now agree with Sir Astley Cooper in the opinion that in real cases of dry and chronic gangrene of old people, direct amputation ought not to be performed. The successful cases which have been reported, can hardly be arranged under this head. Dr. Gibson's successful case, performed in York Co., in 1816, was on a healthy middle-aged man, who had undergone repeated fractures at three different periods—two of them in the same limb; and the dry gangrene was fairly attributed to the effects of the fracture. No doubt the main arteries had been injured locally above the sphacelus, which presented a very different case from those of a general disease of all the arteries in old people. In Dr. Carmichael's case, where both legs were amputated, ten weeks apart, the arteries at the stump were filled with granulated or fibrous matter, which prevented all hemorrhage, and still the patient died shortly after the second operation. This case is mentioned by Dr. Gibson under the head of dry, as distinguished from chronic mortification (a distinction of which, I confess, I cannot see the bearing), apparently for the purpose of disproving the utility of Pott's practice. He was bled for the relief of excessive pain in his legs, at first to fainting, and eight or nine times afterwards, while snow or iced water was applied to the parts. The blood was buffy all the time, and each bloodletting relieved the pain, while warm applications exasperated it, and hastened the gangrene. Opium was only sparingly used; but still the legs were both lost, and the patient died. Dr. Pitney, of Auburn, New York, informed Dr. Gibson that he amputated several times successfully at the thigh instead of the leg, and recommends it therefore as an improvement in surgery. But the character of these cases was not described, and they are alluded to under the head of chronic mortification, as distinguished from dry.

In cases of mortification suddenly arising from severe injuries of the large blood-vessels and nerves in healthy persons, there can be no occasion for a delay of amputation; nor in cases of a mere local obstruction to the circulation, especially if we operate above the point where the line of demarkation will appear likely to form; mortification from tight bandaging of fractures, and other injuries of limbs otherwise healthy, may be classed in the same category. No advantage whatever can arise from deferring the operation in such kinds of sphacelus, for the system will all the time be losing instead of gaining strength. The appearance of the line of demarkation is only desirable when there is a doubt about the possibility of enduring the operation on the part of the constitution.

Mortifications from pressure upon the integuments over the bony prominences of bed-ridden patients, are always preceded by some degree of inflammation, which is followed by vesication, and frequently ulceration, before the supervention of sphacelus. Hence, such affections are generally called bed sores, and experienced nurses always understand their cause and treatment. But the surgeon is never excusable for neglecting the means of prevention of such an occurrence. In all paralytic, or even debilitated persons, he should anticipate it, especially over the sacrum, the hips, and nates. The shoulder blades are not rarely affected with it, and the heels are especially subject to it, under the treatment for fractures

The great difficulty apprehended by some surgeons in amputating for senile gangrene, is supposed to proceed from the suppression of hemorrhage from the ossified arteries of the limb. Some have suggested soft pine or cedar plugs, and others small linen compresses, to be introduced into the orifices before applying the ligature around them. But the most ridiculous and improbable of all these suggestions has been the proposition of an annotator upon Liston's Lectures on Surgery, which consists in a new species of thenoplasty. "In such cases, where it is practicable, pressure should be applied so as to command the hemorrhage; but when this cannot be done, I have succeeded in arresting the flow of blood, by drawing the *surrounding tissues over the orifice of the vessel, so as to form a sort of cap*, and then retained them in this position by a ligature. Sometimes, too, I have succeeded in accomplishing my purpose by lifting *a piece of muscle or skin in the vicinity, leaving it attached by one extremity, for the purpose of nourishment, and then rolling it into a cylinder*, have thrust it, thus prepared, into the mouth of the vessel, and secured it in this position by a suture or ligature." The annotator does not inform us how often he had occasion to perform this exquisite piece of Taliacotian surgery, nor the extent of his vast experience in the operating line for ossified and disorganized arteries. Those who know most about it, however, will say, "*credat judæus.*"

with extending splints. The essential plan of prevention, as well as cure, is to diffuse the pressure from the weight of the body by interposing pads of stuffed hair, or chaff, or wool, under all the hollows of the body and limbs; by frequent changes of position of the body, and sometimes by laying the prominent parts over circular pads or pillows. Occasional bathing of the parts with lead water, or liquor ammoniæ acetatis, or solution of the muriate of ammonia in diluted vinegar, will often relieve the irritation. But mild and unirritating plasters, such as litharge, soap, or gum ammoniac plasters spread on doe-skin, over the prominent parts, should be constantly worn between the embrocations. After a slough has been formed, of course emollient poultices most speedily cause its detachment, after which, an occasional touch with lunar caustic, and the application of mild ointments, with creasote, will effect cicatrization. An efficacious mode of relieving a prominent point from pressure, consists in applying a thick doe-skin plaster, with a hole cut out of its centre, so as to cover all the parts around, while a thinner plaster is laid over the vacancy, to defend the irritated surface.

The cases of mortification of the cheeks in children, mentioned in recent publications under the names of gangrænopsis, cancrum oris, and noma by different authors, perhaps deserve some attention here, although they do not strictly belong to the province of surgery. Some of them commence at once with mortification, and speedily sink the vital forces with large livid and sloughing patches throughout the whole substance of the cheek. Others begin in irritable or malignant ulceration of the gums and mucous membrane of the mouth, and afterwards extend partly by phagedenic ulceration, and partly by sloughing through the cheeks. They all, however, partake of a common character. Except when they arise from the morbid effects of mercury, they depend upon a very irritable state of the system, connected with evident derangement of the digestive organs. The moment the condition of the primæ viæ is corrected, anodynes should be resorted to, and large doses of quinine. For local applications, strong lotions of nitric acid, or of sulphate of copper have been strongly recommended. Caustic potass and the chloride of zinc have been used as escharotics. But the most successful application consists of undiluted nitric acid on pledgets of lint over the whole morbid surface, while the parts within the mouth are protected by a stuffing of dry lint, and externally by smearing basili-

con ointment over the skin. This is the same remedy which Mr. Welbank recommended for sloughing phagedena of the genitals, and has been used here with the same success. The moment the consequent sloughs are thrown off under soft poultices of powdered slippery elm bark, the surfaces will granulate and assume a healthy aspect. As we shall see under the head of plastic operations, the lost spaces will afterwards have to be restored, or rather supplied by portions of integument, dissected up from the neighboring parts.

Hospital gangrene hardly deserves consideration here as a separate subject, because it is rarely witnessed in our country. It has never occurred epidemically in our public institutions as in the large hospitals of Europe. One great difficulty in understanding its character, arises from the very different descriptions which have been given of it by the authors of different periods and countries. One class of authors describe it as a sudden recession of the granulations in a wound, a discharge of filthy sanies or colluvies from the surface, and a malignant appearance of erysipelatous inflammation all around; followed by sloughing of the whole surface, and a typhoid sinking of the powers of the system. Some attribute to it the character of a diffused irritation of the cellular tissue and lymphatic vessels, extending up to the nearest ganglia or glands, and terminating in rapid and extensive sloughing. Others describe it as a more chronic disease, commencing in the form of foul grayish sordes over the surface of the wound, dissolving all the parts below into a grayish fetid pulp. Sometimes they vary, the muscles all slough away, and everything else down to the bones. The great peculiarity of all these forms of malignant gangrene is, that its progress is always attended with hemorrhage, the vessels not being plugged up as in the other kinds of sphacelus by coagula. The constitution is also more suddenly and seriously affected. Indeed the disease is in all cases superinduced in the parts, by the influence of bad air in the damp and crowded wards of filthy hospitals. No matter what treatment is resorted to, the patient never can be saved until the general and atmospheric causes are obviated. The few sporadic cases which have been met with in this city, have been most successfully treated, by destroying the whole of the morbid surface instantaneously by the free application of pure nitric acid, and following it by emollient poultices, while at the same time, every attention has been paid to the state of the constitution. Mr. Liston found it necessary in the north London Hospital to bleed largely,

to purge freely, and promote perspiration with Dover's powder and camphor. It is generally proper, however, to resort early to the use of large doses of quinine with opium, and active stimulations.

ERYSIPELAS.

The term erysipelas has been used with too much indefiniteness, by different authors. While some have meant to designate by it, only certain morbid, or peculiar inflammations of the outer surface, others employ it to characterize all the varieties of inflammatory action, as they are presented in the three organic tissues of the skin, and in the cellular texture beneath. To designate particular forms and cases, as they occur in practice, surgeons have been compelled to resort to a number of qualifying epithets and synonyms. Thus we have erythema, intertrigo, rose, simple or idiopathic erysipelas, true or exanthematic erysipelas, false or spurious erysipelas, vesicular erysipelas, idiopathic and symptomatic, and metastatic, erratic and traveling and œdematous, and finally phlegmonous erysipelas, or diffused phlegmon. We have also to encounter bilious and hospital, and traumatic and gangrenous erysipelas. Now to avoid all the confusion of such an extensive nomenclature, we shall be obliged to make some discrimination between the different classes of cases, and to divide them, if possible, into as many species or forms as occur in our practice. The first division of cases should be made to comprehend those forms of cutaneous inflammation which approximate most nearly to the characters of healthy or phlegmonous inflammation, modified as it must always be by the peculiarities of organization and the individual tissues of the skin, and the greater or less degree of complications between those tissues. The second division will include all those cases of cutaneous inflammation which present morbid peculiarities in themselves, or as they are connected with, and dependent upon morbid conditions of the constitution.

It is only when common inflammation originates in the small follicles or glandules of the skin, and its internal reflection in the form of a mucous membrane, that the process is confined to the immediate space where it was first located. It is the character of all the membranes to diffuse their actions over a greater or less space, both in health and disease, by virtue of what John Hunter called the continuous sympathy. Hence the appearance of extension over the

surface which is considered by most writers as the pathological trait of erysipelas, belongs to almost every form of irritation on the skin. The blush of shame, the redness from sudden vicissitudes of heat and cold, and of every other kind of transient disturbance of the cutaneous capillaries, as well as the more fixed forms of superficial irritation, all diffuse themselves over a considerable space on the surface. If superabundant tears trickle down the cheeks, or a dribbling of urine flows over the skin of the scrotum and thighs, a diffused inflammation of the vascular covering of the chorion will be excited in the form of an *erythema*, which may continue for a length of time. In the opposed surfaces, as about the flexures of the larger joints, the clefts of the nates and perineum, the wrinkles of fatty and relaxed subjects, mutual friction and retention of perspirable matters, will frequently excite a similar inflammation in the same layers which some have denominated *intertrigo*. Active exercise under a burning sun, or in a chafing dry wind, will throw out a similar efflorescence, which has been denominated a rose or rosy eruption. Now all these affections, although diffused along the surface of the true skin, differ exceedingly from the nature of all the herpetic, and many other chronic cutaneous eruptions which are situated in the same textures, and all of them differ again from either of the forms of cutaneous disease which surgeons have meant to designate as erysipelas. The idea of the general anatomists, therefore, is not correct that modifications of texture produce all the modifications of inflammation.* Something peculiar must be superadded to produce each kind of erysipelas either on the part of the constitution, or in the way of the mode of action, as John Hunter asserted. Erysipelas is truly a morbid inflammation, and never has for its object the reparation of diseased or injured parts. Its leading characteristic is, according to Hunter, the deficiency of adhesive inflammation below and around, by means of which alone a circumscribing barrier can be set up to check the progress of disease. The healthy forms of excitement and even inflammation, although somewhat

* What local diseases can be more different from each other than the various exanthemata? and who would mistake the eruptions of rubeola, scarlatina, varicella, and variola, although they all commence in the same tissue? The pits of small-pox result merely from the final ulceration attendant upon the progress of the pustules under the influence of the light and scabbing. The commencement of the efflorescence always takes place in the vascular layer covering the papillary body, where, also, all the eruptions are situated.

diffused, never extend so far as to be at all comparable to the mildest attacks of erysipelas. They yield, moreover, very readily to temporary local applications of various kinds, and often spontaneously decline the moment the exciting cause is removed. Erysipelas, however, in all its forms, is altogether a more persistent affection, and invariably requires constitutional as well as topical treatment, before we can effect its removal.

The first form of erysipelas which we will describe, is the simple, or cutaneous, which frequently breaks out and extends around the margin of wounds, but more commonly occurs on uninjured parts from the influence of some internal causes of derangement. This begins with an inflammatory redness, or blush of greater intensity, which sometimes extends with a sharp and defined border, and at others gradually verges, or is shadowed into the surrounding sound integument. There is, generally, a slight elevation of the cuticle to be felt at the edges, which plainly results from a distention of the capillaries of the vascular layer of the rete mucosum. There is, also, always more or less of a disagreeable sensation of itching and burning, but never the throbbing and pulsation of acute healthy inflammation in the deeper textures. When this form of the disease is wholly confined to the outer surface of the chorion, whether it be attended by vesication or not, it is still called erythema by some authors; but the majority confine that epithet to the designation of the milder forms of cutaneous irritation, as we have before stated. The compound term simple or cutaneous erysipelas is applicable to this condition, even when it penetrates more deeply down so as to affect the substance of the true chorion itself. When the redness is very intense, and the swelling more obvious, so as to incline to a pitting and tenderness under pressure, and the febrile action is decidedly high, we always conclude that the whole substance of the skin is implicated; but we still call the disease cutaneous erysipelas, adding other characterizing epithets according to the complications of each particular case. Thus we call it traumatic erysipelas when it follows a wound, and idiopathic, when it occurs spontaneously; vesicular, when it is attended with the formation of blisters; bilious, when evident symptoms of biliary derangement coexist; traveling, when it extends rapidly, without being checked in its progress by the influence of our remedies; erratic and metastatic, when it breaks out in distant parts after subsiding in its original places of development, &c. In all of these varieties, however, it is the depth to which

the inflammation penetrates the layers of the skin that gives to the disease its intensity and importance. Very superficial irritations leave behind no other organic defect than mere branny exfoliations of the cuticle, and, perhaps, a long continued dryness or harshness, and they never disturb the forces of the constitution to a dangerous extent. But those which are more deeply seated, especially about the head and neck, produce not only thickening and excessive tenderness of the integuments, but also copious infiltrations into the subcutaneous tissues, enormous consequent tumefactions, and severe constitutional irritation, or depression. Indeed the worst cases of this kind, run up to the standard of that higher and more dangerous form of the disease, which all authors have described as phlegmonous erysipelas. The infiltration sometimes degenerates into diffused and unhealthy abscesses, which destroy the subcutaneous cellular tissue, and especially when about the head and temples, gravitate down into the region of the throat, and endanger suffocation. When healthy reaction has followed partial recovery from such infiltrating cases of erysipelas, it is no uncommon thing to see regular and circumscribed collections of pus formed under the skin, as about the eyelids, and cheeks, and ears. It would appear as if these were critical in their character; for on evacuating them by punctures, the remaining vestiges of the erysipelas are almost immediately subdued.

The most important points in the treatment of erysipelas are indicated by the slightest notice of the state of the constitution. The loss of appetite, foul tongue, nausea, and other symptoms of derangement of the primæ viæ, at once lead the way to the administration of emetics followed by purgatives. If the sclerotic coats of the eyes and the skin are stained with a bilious hue, at the same time that other symptoms of hepatic derangement occur, mercurials in combination with other cathartics are especially indicated. The excited pulse, and the heat on the surface, and the suppression of the secretions, are, of course, attacked by antimonials in combination with diluents and other febrifuge articles of the materia medica. Blood-letting is rarely practised in cases of simple erysipelas, but whenever the pulse is hard and tense, and the constitution vigorous, it ought to be premised, and, if necessary, repeated along with the other antiphlogistics. In severe cases affecting the head and face, it is often necessary to repeat the blood-letting several times, and to follow it by cupping and leeching. The oppression of the cerebrum, and the locked or depressed pulse, in such cases, fre-

quently demand large detractions of blood in the first stage. Most surgeons, however, fear the approach of sinking, or the typhoid state of malignant erysipelas so much apprehended in the large cities of Europe. In this country, however, it is very rare that the antiphlogistic treatment is not required in some form or modification throughout the whole course. Only in occasional epidemic constitutions of the atmosphere, when the influence of marsh miasmata operates, is it generally proper to resort to the use of quinine* in erysipelas. The indication is then always clearly manifested by palpable intermissions in the progress of the case. In some damp and unhealthy seasons, especially in the spring, it happens here that prostration of the system laboring under erysipelas into a typhoid state does occasionally occur, and then active stimulation and tonics, and nutritious articles of food, are all indicated as in the similar condition which we have described accompanying mortification. The practice recommended by Dr. Williams, of London, which consists in the administration of Port-wine as a specific in all cases of erysipelas, and that, too, without any regard to the stage or character of the disease, has never been imitated in this city. It is reported, however, to have been adopted by some of the practitioners of New York with remarkable success. As no specifications have been published concerning this treatment of late, we must judge, from our general knowledge of the character of the disease in this country, that it proved successful only in debilitated and infirm constitutions, or among the wretched and intemperate poor.

Concerning the topical remedies, a difference of opinion has

* I once attended a lady, the wife of P. W., Esq., in consultation with the late Dr. Otto. She had, a few weeks before, returned from her summer residence in the country, where remittents and intermittents prevailed. A very severe erysipelas of the face and scalp broke out after a violent attack of remittent, which had been preceded, for some days, by distressing pains in the head. We began by depleting her largely, but perceived, in a few days, that the symptoms decidedly remitted, being much exasperated every other day. We took the hint, and gave the quinine in two grain pills every other hour, with half a grain of opium in each, and very soon checked the disease. I have since given the quinine in much larger doses in similar cases, without perceiving that it augmented the inflammatory action in any respect. In the same way I have employed quinine in violent periodical hemicranias accompanied by acute inflammations of the eye, with perfect success. For all that appears in this way of using the remedy, our southern friends may be right in their conclusion, that it acts as a febrifuge.

always prevailed among the profession. While a majority have preferred soothing and mild applications to keep down the heat and irritation, others recommend, most earnestly, counter-irritants and repulsives, for the purpose of at once overcoming the morbid actions in the skin. By the former class of practitioners dry and absorbent powders of chalk, magnesia, starch, &c., have been dusted over the parts, in mild cases, to allay the irritation. Some are afraid of the use of watery applications, lest they should repel the actions to the internal organs; and others condemn oily and greasy preparations as too irritating. Such cooling and soothing articles, however, as weak lead-water and opium, or Goulard's extract with morphium, or solutions of chloride of lime and soda, with mucilage of slippery elm bark or quince seeds, can never do harm by their repelling influence, while they always contribute greatly to the comfort and tranquillity of the patient. If vesications occur, small punctures of the blisters should be made with a lancet, and some mild ointment like Goulard's cerate, and white lily or elder ointment be applied. The stramonium ointment is also an excellent application to allay the excitement and protect the surface from the irritation of the atmosphere and the clothing. Those practitioners who have preferred counter-irritants to the surfaces affected with erysipelatous inflammations, have not been influenced solely by speculative views. Empirical experience had, for a long time, demonstrated the advantages of directly irritating applications. Thus, strong washes of corrosive sublimate, diluted alcohol, a variety of spirituous tinctures, naphtha, and even pure spirits of turpentine, had all been successfully used as topical remedies in erysipelas. Mercurial ointment, tar ointment, and even blisters directly over the parts, had also been employed for the same purposes. But by far the most prompt and successful of all the remedies of this class, is the dilute solution of the nitrate of silver. In all mild cases, especially such as are called erythematic, a single application of this solution strong enough merely to blacken the cuticle, will completely relieve the irritation. In severe cases which affect the substance of the skin, it will relieve but not cure, and then its application should be followed by emollients, of which, perhaps, the best is the mucilage or thin poultice of slippery elm bark. In traveling erysipelas it is an excellent and frequently successful plan to apply it in a strip all around and just beyond the borders of the inflammation. The iodine, either in the shape of a tincture or of Lugol's strong solution,

is also an excellent application of the same class, and may be used in the same way. Of late the wash, recommended by Velpeau, of a strong solution of the sulphate of iron, repeatedly applied over and around the whole surface, has been employed with great advantage in many cases.* But care should be taken not to allow these counter-irritating applications to be followed by too much hardening and desiccation of the skin. Either of the mild ointments or emollients will generally, however, answer this purpose. In regard to the effects of topical depletion, conflicting statements have been made by authors. Some insist upon it, that leeching and blisters are very apt to prove injurious, and prefer to either of those methods, the use of numerous punctures or scarifications over the inflamed surface. Mr. Dobson's plan of making numerous punctures with a lancet through the entire cutis, is certainly preferable in cases where there are subcutaneous infiltration and excessive irritation, because we can promote a free discharge of blood by warm fomentations, at the same time that the infiltrating fluids are evacuated. But in the milder cases leeches will answer very well, and so will blisters, provided it be thought necessary to resort to such measures in the manageable forms of the disease. It is not likely that a poisoning or sloughing effect will follow either of these applications in simple erysipelas. In this country they have been used very extensively, and without any pernicious effect having as yet been brought to the notice of the profession. They may both be applied over the inflamed surface as well as around its edges, but

* Velpeau's wash is composed of a solution of about one ounce of the sulphate of iron to forty ounces of water, which he repeats every six hours, and confines the rags moistened with it over the inflamed surface by means of a light bandage. He occasionally employs the ointment made of finely triturated sulphate of iron, in the proportion of eight parts by weight to thirty of lard, as a more convenient though less efficacious formula than the solution. Velpeau declares, that in no case did the inflamed surface resist this application longer than from twenty-four to forty-eight hours. The antiphlogistic action of the sulphate of iron has hitherto failed in no case in his hands. He seems to think a valid explanation of its utility may be drawn from its chemical influence in oxygenating the blood congested within the inflamed vessels. In all the cases in which I have used the solution of sulphate of iron, I have employed the sulphate of the peroxide in the strength of an ounce to a pint of water. But I have taken care not to allow the parts to become dry for a long time, by keeping the rags constantly moistened with the solution. I have often used this application for herpetic and other superficial irritations of the skin, with almost as great advantage as in cases of simple erysipelas.

care should be taken not to allow the blisters to remain on too long. They should be removed the moment they *begin* to excite vesication, and be followed by an emollient poultice to promote a free discharge.

Phlegmonous Erysipelas.

The phlegmonous erysipelas was so called from the incorrect idea that it is a compound of morbid and healthy or phlegmonous inflammations, erysipelatous of the skin, and adhesive in the parts below it. The appearances of tension, and induration, and polish or glistening of the skin, however, are not owing to the true adhesive inflammation, but to excessive infiltration of unorganized liquor sanguinis and serum, which over-distends the cutaneous cells, and the subcutaneous cellular texture. This is altogether a more serious disease than either of the forms of erysipelas which we have discussed. The excitement is vastly more intense, and the progress more rapid. The inflammation does not commence superficially, and extend downwards by a contiguous sympathy, but all the tissues are simultaneously affected, from the cuticle down to the subjacent fasciæ, and sometimes even to the muscles. Hence, the swelling increases very rapidly, and eventually becomes enormous, and almost always uniform around the limb. The surface becomes smooth and shining, and very firm and painful under pressure. When vesications form over the surface, they do not contribute materially to the relief of the symptoms; and unless the constitutional treatment proves speedily successful, an imperfect subcutaneous suppuration results, which greatly increases the hazard of the case. The suppuration does not consist of genuine pus, but of a sanious or bloody ichorous matter, which infiltrates around into the unprotected cellular tissue, and breaks it down or destroys its vitality by its irritating qualities. This is the period in which blisters prove so injurious. The skin being not only over-excited but greatly weakened by the destruction of its subcutaneous supply of vessels, is easily injured by a severe stimulus. The application of a blister, or of any other irritant, is then readily followed by sphacelation.*

* This sphacelation is of the superficial kind, however, like that which results from severe burns with red hot iron or coals. It is generally confined to the skin alone, but sometimes involves the subcutaneous and aponeurotic fascia covering the muscles. In a short time it turns black, or brown, and dry, like the rind of an old dried ham, and requires very free incisions to discharge the

Mild and soothing emollients must, instead of such applications, be resorted to, and free incisions made to discharge the offending purulent matter. The dead cellular tissue will afterwards float out with the sanies, in sloughs, like flakes of tow. By moderate and equable bandaging, it will then be possible to cause an adhesion between the under surface of the detached skin, and the lining surfaces below, and thus preserve its vitality.

But it should always be our object to prevent such an unfortunate result. If a case of phlegmonous erysipelas is allowed to progress until it reaches that point, all the dangers of prostration from common mortification have to be encountered; and precisely the same treatment will have to be instituted.

sanies from beneath. Some years ago I was called on by two respectable physicians in Kensington, to amputate at the shoulder joint for what they supposed to be a mortification of the entire left arm and forearm from erysipelas. When I got there, I found the whole limb hard, dry, and brown, except the two last phalanges of the fingers and thumb, the palms, and a narrow stripe up along the inner side of the whole limb to the shoulder. On inquiry, I then found that a very large blister had been applied during the active stage of the inflammation, so as to envelop the whole limb, with the exception of the surfaces alone, which still remained sound. Instead of amputating, I therefore made long and free incisions through the hard and dead skin in various places. From these, an enormous quantity of foul bloody sanies was discharged, containing flocculi of sloughy cellular tissue, and finally masses of dead aponeurosis. The whole integument finally came off, leaving, under poultices, only the sound portions which I have mentioned. The patient was supported by tonics and stimuli, until finally the limb was saved, with a horrible cicatrix, which stiffened and contracted the elbow, and deprived him of the use of most of the muscles for life. A similar case occurred some months afterwards, in the person of Mr. O'Hara, a very respectable old gentleman, of 62 years, in South Third street. He had been under treatment for an erysipelas of one of his legs, which eventuated in an enormous tumefaction of the region of the gastrocnemii. A blister was applied over that space, and the whole skin sloughed away, with the discharge of very offensive sanies and subcutaneous sloughs. When I saw him the muscles were all dissected apart by the infiltration of sanies, and the consequent sloughing away of their connecting cellular tissue and fasciæ, and hung down like relaxed ropes or rags. By active tonics and nourishment, and supporting the relaxed parts by strips of adhesive plaster and bandages, the old gentleman finally recovered without amputation.

I recollect another remarkable case of cutaneous sloughing, from a blister. The late Dr. Snow, jr., called me in to consult with him in the case of a little girl, six or seven years old, in Race street, over whose right buttock an enormous slough was loosening, together with a thick mass of subcutaneous cellular tissue and fat, about a week after the blisters had been applied there for a severe erysipelas, which had been attended with great tumefaction. The little sufferer died, notwithstanding the use of powerful tonics and opiates.

In general, phlegmonous erysipelas requires altogether a more active antiphlogistic treatment in the first stage than the milder forms. The pulse is apt to be small and thread-like from depression, and not from debility. It feels like a small and tense musical cord, instead of being soft, tremulous, and evanescent, as in the sinking states of the system. No matter how intemperate the patient may have been before the attack of this disease, this pulse, whenever it is presented to us, must be unlocked by free, and frequently by repeated blood-lettings, before any remedies can act favorably upon the system.* After the pulse has risen and expanded under the influence of this great preliminary, antimonial emetics, followed by nauseating doses, in combination with mercurial cathartics, will speedily check the violence of inflammatory reaction, and then the appropriate local remedies will have an opportunity of exercising their influence. Of these, nothing is equal to free and deep incisions made through the most strangulated parts, and followed by warm fomentations and emollients. The punctures of Bright and Dobson, and leeches also, are wholly insufficient to

* I once attended a very intemperate woman, of about 30 years of age, the wife of the then tavern-keeper at the Metamora House, in North Sixth street. She had fallen down stairs, and driven the fragment of a large hair comb for some distance obliquely under the back part of her scalp. A violent traumatic erysipelas of the whole head followed, which was attended with enormous tumefaction, and exhibited all the characters of the phlegmonic species. Her tongue became hard and dry, her skin very hot, and her pulse small, quick, and wiry. She was alternately delirious and comatose, and the wound discharged a fetid sanious ichor. I bled her three times largely the first day, and twice the second day, and purged her with large doses of calomel, after a full vomiting with tartar emetic. Her head was repeatedly scarified with deep incisions, and she was cupped twice on the nape and temples. She got well finally, under the continued use of salts and tartar emetic, with poultices of slippery elm bark to the denuded scalp. In the majority of such cases I admit it will become, during the progress of the disease, necessary to sustain the powers of the intemperate system by brandy and opium, but she never had occasion for stimuli. It was always the practice of Dr. Physick to bleed largely in the first state of phlegmonous erysipelas, in every constitution, and he rarely administered any other stimuli than the carbonate of ammonia afterwards. In the present constitution of our atmosphere, (and erysipelas has prevailed here extensively during the last five years,) many practitioners find it necessary to give opium and calomel in sufficient doses to quiet the irritation and affect the gums slightly, before they can eradicate the disease. In all debilitated systems, however, quinine and brandy have to be employed in the latter stages.

answer the great indication of overcoming the disposition to subcutaneous infiltration. They may act favorably as mere adjuvants, and so may blisters, if not applied too early before the violence of the actions have been overcome, or too late after the occurrence of infiltration below the skin. But nothing can be substituted for the incisions in the severe cases which threaten unhealthy suppuration and sloughing. Incisions are, however, no longer made by the foot or the yard, along the whole length of the inflammation, as was once recommended; a number of short ones from an inch to three inches long, are made in suitable places, and deepened sufficiently to reach the internal seat of effusion, whether exterior or interior, to the subjacent fasciæ. The hemorrhage from these incisions can be controlled at pleasure by warm fomentations and a dependent posture, when we wish to favor it, or by pressure and an elevated posture, if too severe a flow compels us to suppress it. In most cases, after such incisions, warm fomentations and emollient poultices or emulsions will speedily relieve the inflammation, and produce a shriveling or contraction of the parts. It is always best to support the vessels, therefore, and to promote re-absorption of the remaining fluids by gentle bandaging over the applications immediately covering the inflamed skin. As we have before mentioned under the head of simple erysipelas, it is no uncommon thing for phlegmonous abscesses to be subsequently formed in the debilitated parts, in consequence of the reaction which follows the use of stimuli and nutritious articles of food. The discharge of pus from such secondary abscesses generally carries off all the remaining irritation, and may, therefore, be considered as the critical termination of erysipelatous fever.

Hospital Erysipelas.

It is impossible to form any definite idea of this variety of the disease from the description of European authors, unless we agree with them in the conclusion that it is so far modified by the influence of the foul atmosphere of crowded hospitals, as to become contagious. From the great caution they all enjoin against the use of sponges, and other means of communication in the wards of a hospital, one must necessarily conclude that they have been convinced of its contagious qualities. But from the equally cautious directions which all writers give in favor of free ventilation and cleanliness, under the same circumstances, it may well be decided that the in-

fluence of all the causes which can produce debility and irritability of constitution, chiefly affect the character of this disease in a hospital. The abhorrence which is generally expressed of all modes of depletion, and the universal employment of the stimulating and tonic plan of treatment are also conformable to the same opinion. Although an occasional outbreak of a severe form of erysipelas has appeared in our hospitals, the disease has never been thought to present any marked peculiarity, and we therefore pass on to the consideration of one or two more topics connected with this department of surgery.

Gangrenous Erysipelas.

During the harvest season of our northern latitudes, sporadic cases of this terrible malady sometimes occur among intemperate laborers who work from sunrise to sunset in the open air, and under an almost tropical sun. Stimulated by high daily wages, and the most pernicious kinds of alcoholic liquors, such men sometimes overtask their powers, and inflame their systems to the highest pitch of exasperation. The food which they consume at this season of the year is, moreover, especially unwholesome. It consists almost exclusively of badly cured salt meats, and heavy Indian corn bread, with the half decayed vegetables of the preceding year, combined with a harsh drink of fermented apple-juice, called cider, pickles, and a plenty of fresh milk.* It naturally follows, that intemperance com-

* When I spoke of this subject in a surgical lecture at one of the medical colleges in this city, several years ago, it happened that a very intelligent old gentleman from the interior of New England, was in attendance in company with his son, then a student of medicine. The old gentleman stopped to converse with me after the lecture, and stated that he had personally witnessed three such cases of sudden mortification, and heard of four others in his region of the country within a period of twenty years. They all occurred in harvest and mowing time, in the irregular sort of laborers, who frolic about the country at most seasons, and let themselves out by the day at high wages in harvest time. He stated the difficulty of keeping any kind of fresh provisions over a very few hours in the hot summer days and nights, and want of all new vegetables in that time of the year, to be the great cause of the use of such unwholesome diet as I have described. In the northern states, no summer vegetable produce ripens so early as harvest time, and the laborers are compelled to feed on half decayed or sprouted potatoes, beets, cabbages, &c., of the preceding year. Of late, however, I understand that more attention has been paid in the north, to the cultivation of early spring vegetables and fruits, and that the use of wheat flour has become more common there among the laboring

bined with such diet and fatiguing exposure to an ardent sun for fourteen hours every day in succession, must tend to the production of the most dangerous state of constitutional irritability. Then the slightest prick or contusion will always be followed by a widely diffused inflammation. But occasionally, an overwhelming and speedily fatal explosion of constitutional and local disturbance will supervene. A mower who has a short time before struck his foot against the sharp point of a twig, or a reaper who has merely scratched a finger with a stub of straw, will throw down his implement of labor, and scream with mortal agony. The injured member will suddenly tumefy, and present a glazy appearance with livid streaks, intermingled with green and yellow patches. Gangrenous vesicles will soon form, and a putrescent odor begin to exhale. The pulse will be feeble and tremulous, the skin cold, and the respiration hurried and moaning. The face will be contracted, or hippocratic; the breath putrid, the eyes glairy, and the epigastric region distressed with a sense of horrible oppression. In from twelve to twenty-four hours the poor wretch will die, with the limb enormously swollen, tense, and crackling, with all the appearances of a malignant erysipelas, terminating in gangrene. No treatment has ever been known to check the progress of this disease. The tumefaction and lividity will, in the meantime, have extended up to the very trunk of the body so as apparently to have invaded the vitals. The laborious fishermen on our coast, especially those who are addicted to intemperance, and still more coarse and indigestible fare than the agricultural laborer of the same class, are said to be occasionally carried off by the same kind of explosive inflammation, from very slight wounds in extremely hot weather. Practitioners who have seen such cases, declare that the whole system becomes immediately putrescent, on the invasion of the erysipelatous-looking inflammation and distention; that the blood becomes dissolved, and that the muscles do not stiffen before burial. Indeed, they say that the muscles become softened almost into a rotten pulp, and all the soft parts become detached from each other, and from the bones beneath in the affected limb. The only treatment which ever appeared to make any impression upon the constitution, consisted in a prompt evacuation of the stomach by ipecacuanha or mustard emetics, dashing buckets

people. But in all probability, the great and glorious temperance movement of the day has done most towards checking the development of such cases as I have described.

of cold water over the whole naked body, wrapping up the limb in sheets wrung out of cold water, and administering large doses of ammonia, either in the form of the carbonate or aromatic spirits. But even such a course has only been seen to give a temporary check to the progress of the tumefaction and sinking; the local disease has only been protracted thereby so as to go on to a more thorough degree of sphacelation. It would seem in this class of cases, as if the influence of injurious causes had not only rendered the solids excessively irritable and weak, but that they had also destroyed the vitality of the blood, or at least so far modified it as to induce a decided proneness to putrefaction.

Less violent forms of erysipelatous inflammation terminating in gangrene do, however, occur in all climates, and under any variety of circumstances which can produce a morbid contamination of the blood, accompanied by great irritability of the solids. When Professor Atlee resided in Lancaster, he made post-mortem examinations of two cases which died in the county almshouse of that city, after a more protracted form than has been above described. They lived long enough to infiltrate the cellular texture throughout almost the entire system, with ill-digested purulent matter, and to produce very much the same state of things as has been described by Velpeau and others under the name of *purulent absorption.* The probability, however, is, that in such cases pus has never been actually absorbed: its elements have merely been retained in the circulation by a morbid development of the blood, and, finally, exhaled from the capillary vessels during the last tumultuous struggles of life.

The great peculiarity of the whole class of such cases consists in the fact, that a general diffusion of morbid inflammation takes place throughout the whole cellular system, and hurries on to the rapid destruction of life both in the solids and fluids. In lighter cases of the same kind, the inflammation is confined to the subcutaneous cellular texture of the injured limb, and generally implicates also the blood-vessels and lymphatics. The skin, at first, becomes merely distended over the subjacent inflamed parts, but, finally, itself presents the appearance of erysipelatous blush and tenderness, and tension. This condition gave origin to the compound term *erysipelas-consensuale*, or symptomatic erysipelas. Infected wounds received by students of medicine whose constitutions have been rendered irritable by long confinement in the dissecting-room, and

punctured wounds of irritable subjects in various other occupations of life, often generate the same condition of things. The inflammation sometimes travels up through the veins or lymphatics, or both, and also through the cells of the cellular substance, until, finally, it produces the most intense local and constitutional disturbance. The skin merely becomes secondarily affected, and, perhaps, the name erysipelas is, therefore, a misnomer in this department of surgery. It makes no difference, however, to the proper understanding of the subject, provided we consider it in all its bearings. The terms phlebitis, or angeioleucitis, or diffused cellular inflammation, may each or all be substituted for symptomatic erysipelas, and still the pathology and treatment will prove the same. If we do not, in addition to proper constitutional treatment and topical depletion, make free and deep incisions in the most tumefied parts in all severe cases, they will run on to purulent infiltration and subcutaneous gangrene. The influence of warm fomentations and of steam or vapor baths, has never been rated sufficiently high by surgeons in their management of this class of cases. After the necessary evacuants, the universal, and sometimes even the local application of steam, combined with the use of Dover's powders or other sudorifics, will effect wonders in the way of determining to the surface and relieving the inflammatory irritation.

Erysipelatous Inflammation of the Internal Membranes.

If a diffused and morbid inflammation of the outer integument deserves the name of erysipelas, a similar affection of the free surfaces of either of the internal membranes may well be regarded as entitled to the same epithet. This is especially the case with the mucous membranes, which are throughout so perfectly analogous to the cutaneous structure in all their characteristics. Wherever they are covered with a distinct epithelium, they are clearly organized on the same plan, with a deficiency of the coloring pigment alone; and where they are destitute of an epithelium, the covering mucus becomes desiccated into a cuticle, after a long protrusion and exposure to the influence of the atmosphere. Indeed, the sympathies between these membranes of the skin are so strong, that it is almost impossible for a disease to exist in one without some derangement being manifested in the other. In the exanthemata no practitioner can overlook this phenomenon. The whole extent of the Schneiderian membrane, from the eyes down to the throat, is affected be-

fore the skin in measles, and the inflammatory irritation afterwards travels down into the mouth, over the tongue, and into the pulmonary passage, and not unfrequently into the intestinal ones, during the progress of the eruptions on the skin. The same co-extension of internal and external eruptive actions goes on in scarlatina, perhaps, in a more striking degree, except that the internal commences in the lining of the throat and mouth, instead of the nostrils. In small-pox the nostrils and throat often become obstructed with severe inflammation and tumefaction, and the veritable eruptions of the skin appear to be developed extensively in many cases throughout the mucous membranes. In the petechial forms of typhus fever, and in hectic, it is very common to witness intestinal irritation, terminating in ulceration of the ileum and colon. We need not dwell, however, upon this well-known sympathy. John Hunter fully developed its importance in his admirable elucidation of the association of syphilitic symptoms in the same parts, under the head of consent of parts. In fact, almost every cutaneous disease, when carefully inquired into, will be found to have some corresponding development in the inner reflexion of the integument. We often see it in herpes, in the form of internal patches of red and irritated eruptions about the mouth, tongue, and nostrils, while we are watching the progress of our treatment for the external manifestations of the disease. The same thing takes place in all the varieties of erysipelas. It is hardly possible to examine a case of this efflorescence without discovering signs of some internal irritation of the mucous membranes, especially in their nasal and gastric extensions. How often do we find the Schneiderian portion dry and swollen, and irritated even down into the throat and fauces, in severe cases of erysipelas, especially of the face and scalp. Even in the milder forms of the disease, it is no uncommon thing to witness such marks of irritability of the stomach and intestines as characterize a phlogosis of the lining membrane of these organs. These complications do not usually, however, require any important modification of the treatment heretofore described. Care should always be taken in cases accompanied by severe gastric and intestinal irritation, not to increase the difficulty by too severe cathartics. Drastic purgatives are exceedingly apt to augment the irritation to a dangerous extent, and create that unfavorable bloating of the abdomen which is called meteorism, or tympanitis. Moderate doses of the blue pill, combined with rhubarb and ipecacuanha and mucilaginous drinks, become the suitable internal remedies in such

cases. The inflammations of the pituitary and salivary portions of the mucous surfaces within reach, should always be treated with a solution of nitrate of silver, applied by means of a camel's hair brush or a swab of fine linen. Sometimes a light application of the solid caustic brushed lightly over the swollen part of the mucous membranes, will be followed by more immediate benefits. Injections of a strong solution of the sulphate of iron, as high up and as far back as possible through the nostrils, have relieved a few cases in which trials have recently been made, in an evident degree. This application can be more safely made, and over a more extensive range of surfaces than any other which has been recommended.*

Diffused inflammations of the mucous membranes often occur as an idiopathic disease, and, to all appearances, independently of any sympathetic disease of the skin. The tongue becomes very florid, smooth and irritable, the whole lining of the throat and pharynx appears red and inflamed, the stomach and bowels are irritable, and exhibit the signs of subacute inflammation of their villous coat. Solid food of every kind produces a sensation of weight, and often of pain in the epigastrium. The bowels are sometimes costive, but more often irritable, and throw off watery discharges. This condition presents all the characters of an erythema, or mild erysipelatous inflammation of the gastric reflexion of the great mucous membrane, and can be successfully combated by some of the same remedies which are used for the cure of erysipelas of the skin. Mild diluents and mucilages, with small doses of the nitrate of silver, prove the most efficacious measures in such cases. Nothing can do more good

* Perhaps the diffused inflammation of the bronchial mucous membrane, in the most disastrous forms of croup, may be advantageously alluded to here. In all of the post-mortem examinations I have made, the whole track of this tissue, through all the tubes that were laid open, presented the appearances of a morbid inflammation. The best evidence of a morbid peculiarity in the inflammation in such cases, consists in the fact that an albuminous, or, as some think, a fibrinous exhalation instead of an altered mucus, has been made on the free surfaces, in the form of a false membrane. This condition of things precludes all hope of relief from the operation of tracheotomy in the worst forms of croup, because it is not possible to give any degree of aid to more of the inflamed portion of the membrane, than that which lies within reach of the surgeon. The large doses of calomel recommended by Hamilton, and the application of lunar caustic as a counter-irritant over the trachea and chest, have done more good, in desperate cases, than any other plan of treatment I have ever seen employed.

than half a grain of the pure nitrate of silver in a bread pill every four hours in combination with sago or arrow-root jelly, and stale wheaten bread. In cases accompanied with any kind of constitutional irritation, the combination of the same remedy in a pill with hyoscyamus or opium, will prove more advantageous. Of course external depletion, or counter-irritation over the epigastric region, will aid very much in fulfilling the same indication.

Erysipelatous Inflammation in the Serous Membranes.

It is in the serous class of membranes, however, that diffused inflammations prove most disastrous. Although, in healthy conditions of the system, they always set up the process of adhesion around an injured or inflamed spot, and, by an agglutination of the opposed surfaces, close the general cavity which they line, and thus circumscribe the disease, such protective powers are not evinced by them in morbid constitutions. We all know how different a state of things obtains in puerperal fevers which occur in delicate females, rendered irritable by the hemorrhage and agonies of child-bearing. The exciting causes of inflammation acting upon the great serous membrane of the abdomen, then produce a diffusive and uncircumscribed action which traverses every one of its ramifications, and by mere extent of diseased surface, rapidly overcomes life. Exactly as in cases of superficial scalds and burns, the degree of irritation and of course danger, is in proportion to the area of the surface affected by the injury. After a very extensive propagation of the inflammation, it is almost impossible for the system to withstand the influence of the consequent morbid impression. But the puerperal state is not the only condition in which diffused peritoneal inflammation occurs. All irritable or mobile temperaments, such as John Hunter conceived were prone to excitement, without possessing the power of maintaining it, are liable to the same want of adhesive inflammation to circumscribe wounds and injuries of the peritoneum. Also, every temporary morbid condition of the system which can produce a similar deficiency of healthy power; and this, too, will prove the case in every other membrane of the same class. Uncircumscribed inflammations of the pleuræ, of the serous lining of the pericardium, and of the arachnoids, all terminate in much greater prostration and danger than the healthy forms of that process in the same parts. Adhesions between the opposed surfaces of the serous membranes never destroy life; they only embarrass the functions of the parts

among which they occur. Nor do they ever produce much pain or irritation. It is the acute and diffused inflammations in these tissues which are attended with so much prostration, tenderness under pressure, and constitutional disturbance. As these forms of diffused membranous inflammation are liable to follow penetrating wounds of every description, as well as operations for hernia, lithotomy and the extirpation of inward tumors, something ought to be said respecting the proper mode of treating them, especially as regards the peritoneum. It is obvious that their tendency in every grade of violence, will always be to prevent the reparatory efforts of nature, so that the expectant plan of waiting for the development of events is altogether inexcusable. The moment we discover any degree of tenderness under slight pressure, supervening upon a penetrating wound, or the rise of febrile symptoms of any kind, we should immediately resort to topical depletion, to purgatives, and every measure which can subdue the inflammation. If disease be allowed to extend at all, it will generally contract the pulse into a small thread which may deceive an inexperienced observer into the idea of a sinking, but which can easily be distinguished as a tense or hard, and not a soft pulse. The surface which, under the first shock of the injury, had been cold and pallid, will become hot and dry, the secretions suspended, and the abdomen exceedingly tender under pressure. By this time the patient will have acquired a tolerance of blood-letting, notwithstanding the existence of preceding debility; and frequently large and repeated detractions will be required to unlock, and afterwards reduce the over-excited pulse. The cotemporaneous use of active purgatives will also be needed to overcome the semi-paralyzed condition of the muscular coat of the intestines. Cupping cannot be endured by the patient, on account of the excessive peritoneal tenderness, but repeated leeching must be substituted and followed by a large epispastic. Finally, opium in full doses, and combined with calomel, will generally be necessary to allay the irritation and promote the secretions. Of late years the ol. terebinth. has been a good deal employed for the same purpose, in consequence of the recommendation of the Dublin practitioners. It may appear singular that the very same remedies which prove so successful in arresting the deposition of coagulating lymph in iritis and other cases of rheumatic and phlegmonous inflammations, should be recommended for the opposite condition of disease. But all the circumstances are not alike. The nature of the inflammatory actions

vary exceedingly, so that essentially different results may follow the same influences under opposing circumstances.

The opinion which some writers appear to have entertained, in regard to the diffusion of inflammation through the fibrous membranes and fasciæ, so as to produce destructive irritation and tension, is unquestionably unfounded. The aponeuroses are not liable to any other than a low species of adhesive inflammation, which sometimes produces a slight thickening and opacity of their texture. They slough as the tendons do, from an intense inflammation around, or on either side of them, which causes a detachment of all their vital connections. Diffused inflammations and infiltrations into the subjacent cellular tissue, will necessarily cause a separation and sloughing of them in large sheets, such as have been described by numerous authors.* Traveling inflammations of the nearest vessels and nerves may also produce a similar result, especially when they terminate in erysipelatous tumefactions of the entire limb, or portion of the body in which they occur. The result, however, in all such cases should be attributed to the primary cause, and not to any peculiarity of disease in the aponeurotic fascia.

* Some eighteen or nineteen years ago, a boot-maker named Wiley, in the Northern Liberties, punctured the back of his hand with the point of his awl. In a few days an enormous tumefaction of the entire limb ensued, which assumed an erysipelatous appearance, and was attended with paroxysms of intense pain, and difficulty of breathing, and fever. After the formation of several infiltrating abscesses under the fasciæ of the arm and forearm, he was temporarily relieved, in some degree, by vapor baths, and sudorific doses of Dover's powder and camphor. In a few weeks, however, he contracted a violent peripneumony, and died very suddenly. On a post-mortem examination, the puncture was found to have traversed the main branch of the muscular spiral nerve on the dorsum of the hand, just below the wrist. The nerve was left in an insulated state for full two inches below and above the puncture, and the ragged cellular tissue around was stained a deep yellow, from the still unabsorbed puriform effusion which had been thrown out around the course of the puncture. The fascia had been extensively detached from the muscles of the forearm, where also matter had been infiltrated, and no doubt it would have sloughed away, had not timely incisions been made.

FURUNCULUS.

The pathology of common boils does not appear to be well determined, in consequence, no doubt, of a variety of affections having been comprehended under the same denomination. As we have already observed, small subcutaneous abscesses of the phlegmonous kind, and inflamed cutaneous follicles from an obstruction of their outer orifices, have both been confounded with this disease. The term furunculus, however, was meant by the older surgeons to designate a peculiar and morbid inflammation of a small portion of the cutis vera, and subjacent cellular tissue, which begins with acute, pungent, or burning pain, and irritation, and terminates in a sloughing of the substance originally affected. The surrounding inflammation is of the phlegmonous or healthy kind, and of course sets up a circumscribing barrier of adhesions around and below, and prevents infiltration. In a few days, the process of ulceration will discharge the purulent matter, and finally the slough, or core as it is called, through the pointed apex, and a small ulcer of the healthy kind will result, and heal by granulation. This process is, however, a slow and painful one, and may be greatly abridged by an early incision made entirely across and through the whole of the tumor, so as to remove tension and loosen the slough. Blackening the surface with lunar caustic, will also contribute towards relieving the irritation, and an emollient poultice will afterwards speedily effect a cure. The disease, however, is liable to return in the neighboring parts, and not unfrequently a long protraction of suffering results from this cause. Blood-letting, a careful diet, and long persistence in a course of alteratives and laxatives are, therefore, necessary in some cases, in addition to the appropriate local treatment. If timely incisions are not made, it is possible to reduce the surrounding inflammation, before detachment of the core, and then an indurated tubercle, or tumor will remain for a long time in the state which some have called a fluid boil. The slough is evidently encysted like a bullet, in such cases, by the process of adhesion, and organization of the effused lymph. This occasionally remains for life, but more commonly it is dispersed, or cast out, by a subsequent reproduction of the inflammation.

ANTHRAX, OR CARBUNCLE.

This disease resembles furunculus in one respect at least, for it exhibits a specific tendency to the destruction or sphacelation of the portion of skin and subcutaneous cellular tissue first affected. But the space is much larger, so that instead of presenting a conical tumor, with an apex in the centre, it is broad and flat, and frequently depressed in the middle. The surrounding inflammation is also erysipelatous in its character instead of being phlegmonous, and often allows the unhealthy sanies which is secreted in the latter stages to infiltrate to a considerable distance. The core or slough being broad, it generally happens that several orifices are formed over it to discharge the matter instead of one; and a long and tedious period of ulceration has to be endured before the parts can granulate. To abridge this process, and mitigate the intense burning pains, it is the common practice to make deep crucial incisions across the tumor entirely through the skin, and to apply a strong escharotic to the edges. Undiluted nitric acid applied by means of a little lint, or strong caustic potass* are generally preferred, and emollient poultices are afterwards applied until the slough is discharged. As this disease generally occurs in irritable and morbid constitutions, great attention should be paid to the constitutional treatment. But, although intemperate persons are especially subject to it, even they generally require antiphlogistic and evacuant remedies in the first stage. Tonics and stimuli are rarely required until the system begins to succumb under the process of suppuration and sloughing. In old persons it proves a highly dangerous malady, and often destroys life in spite of all our efforts at maintaining the forces of the system by tonics and opiates. It is especially apt to prove fatal when it attacks the head, throat or neck, and sometimes when it is seated on the shoulders.

* Dr. Physick did not originate the treatment of anthrax by caustic potass. It was a favorite remedy on the continent of Europe more than half a century ago. But he modified its use by the previous application of a blister and poultices, and often destroyed the whole of the undermined skin by a free application of this caustic. I have repeatedly succeeded by an early incision, followed by lunar caustic washes all around, and poultices of slippery elm bark with laudanum. Full doses of opium and calomel given internally at the same time, will speedily relieve the intolerable burning pain and restlessness.

ABSCESSES.

So much has already been said of the modes of formation and modifications of healthy abscesses, under the head of suppuration and granulation, that we need not occupy any space here with a longer consideration of the same subject. If all fluctuating tumors containing fluid, however, are to be considered as abscesses, we shall be presented with a sufficient variety of cases to render it necessary to dilate at some length upon their history. The first varieties of which we are naturally led to speak, as differing in a remarkable degree from the healthy kind, are the diffused and infiltrating abscesses. Whenever the pus is confined or bound down by a strong fascia, as is often the case in the regions of the neck, and thigh, and forearm, it is compelled to travel for some distance up and down the parts before it can make any progress towards the surface. Even after healthy inflammation, which has been accompanied by the development of a circumscribing barrier of adhesions, this diffusion will be more or less evinced by the pressure of the superincumbent aponeurosis.* But especially after morbid and

* After contusions on the fore part of the thigh, and sometimes after deep seated pains there from the influence of cold, very deep seated collections of pus are formed along the whole length of the limb. In one case, of a young man in Brown street, Mr. Haverstick, who had been treated for eight weeks by two eminent homœopathists, as an inflammatory rheumatism of the femur, the matter had traveled through the opening for the femoral vessels in the adductor tendons, down to the very heel. I made a post-mortem examination of that case, and found the most extensive separation of the muscles of the leg, as well as thigh, from each other. The matter had even penetrated into the anterior interosseal space, along the track of the anterior tibial artery. I separated those muscles from each other in the same manner that it had affected the extensors and flexors of the thigh, and those of the posterior tibial space. I was not called in to see this young man until the day before his death, when he was rapidly sinking under a gangrene of the whole integument of the limb. Although I made free counter-incisions and evacuated a prodigious quantity of sanious pus, he continued to sink in despite of stimuli and tonics. Such abscesses, when confined to the thigh, are called by some writers *femoral* abscesses. The matter is certainly sometimes situated under all the muscles, and in contact with the periosteum. It is then difficult to detect the fluctuation unless the muscles are all completely relaxed by posture, and nauseating doses of antimonials, while a careful exploration is made by the palmar surfaces of both hands and fingers, in all directions and situations. Some twenty-eight or twenty-nine

traveling inflammations of the vessels or cellular texture, such collections are not only widely diffused, but they are infiltrated and liable to be followed by extensive destruction of the cellular substance itself, and sometimes, also, of large sheets of the undermined fasciæ or other integuments. The only way of preventing or remedying such difficulties, is to make free incisions and counter-openings through all the coverings of the collection. Mere punctures will not prove sufficient, as in case of common phlegmonous abscesses, nor will it ever be proper to wait for the process of pointing towards the skin. As soon as the presence of matter is detected by the sense of fluctuation, and an erythematic puffiness of the skin, the incisions should be made, and whenever the diffusion is very great, as along the whole extent of the thigh or forearm, counter-openings should be made at the opposite ends, as well as in the centre of the collection. Soft and porous, or sleazy cotton bandages should then be bound around the whole limb, so as to make equable compression. Openings should then be made through the bandage directly over each incision, and soft poultices or moistened pieces of flat sponge applied over the orifices. The matter, as well as the detached portions of sloughs, will thus be forced out through the orifice, while the opposite sides of the cavity will be compressed together at the same time by the bandaging. In this way an immense saving of time and suffering will be effected in the closing of the abscess. The necessity of granulating and long continued suppuration will be avoided, by an almost immediate cohesion between the opposite surfaces, which, as we have said before, partake of all the characters of an inflamed serous membrane.

Fetid Abscesses.

We have already explained the formation of fetid abscesses in the history of suppuration about the air passages and the intestinal tube. The absorption of air and of fetid gases by endosmosis, through the walls of such abscesses as are situated near the respi-

years ago, when I was a house pupil of the Philadelphia Almshouse Hospital, I saw a beautiful boy, of nine years of age, perish miserably with this kind of abscess, because I could not persuade my heavy-fingered seniors that my more delicate members could detect a deep seated fluctuation under the extensor muscles. The dissection revealed an enormous abscess extending from the groin to the very condyles of the femur, and in contact with bone throughout most of its extent.

ratory tubes, or about any of the ramifications of the mucous membranes, speedily induce a putrefactive elimination of sulphuretted hydrogen, or of hydrosulphate of ammonia from the pus—no matter how healthy it originally may have been. It will then instantly blacken silver probes and other instruments, as well as disgust us by the fetid effluvium. No doubt it will, also, deteriorate the blood and enfeeble the energies of life, if allowed to remain unevacuated. Antiseptic lotions of pyroligneous acid or creasote are, therefore, generally resorted to after free incisions and poultices.

Chronic Abscess.

Although genuine pus is always the result of acute inflammation, a variety of puriform collections in the shape of fluctuating abscesses are not unfrequently met with, independent of all inflammatory actions. When nothing more than a slight sensation of uneasiness, hardly accompanied by any degree of constitutional disturbance, is complained of, the abscess is properly termed chronic. The want of sensibility, the slow progress, and the entire destitution of inflammatory fever in such cases, indicate peculiarities which altogether distinguish them from phlegmonous abscesses. Still, if any circumscribing barrier exists around them, and especially if the superincumbent integument looks at all red or discolored, it is impossible not to conceive that some degree of chronic inflammation must have preceded them. Their pathology has been attributed by authors to an enfeebled or cachectic habit, a low degree of nervous energy, or a deterioration in the plastic qualities of the blood. Certainly slight injuries may cause them in any relaxed portion of the body under such circumstances; and they sometimes form independently of all local disturbance. When they are opened, they always discharge a thin and badly constituted, and sometimes an offensive purulent fluid. Before laudable or genuine pus and granulations can arise from them, the state of the constitution has to be improved by alteratives and tonics, and frequently the cavity has to be stimulated by corrective washes or injections.

Cold Abscesses.

When no circumscribing border or base can be detected, and no redness or tenderness is discoverable over or about them, such abscesses are denominated cold by most authors. John Hunter described them as "collections of matter without inflammation."

The contents almost always consist of a thin, serous fluid, sometimes rendered opaque or turbid, by an intermixture of the irregularly constituted globules of softened fibrin described by Mandt. Nothing like the true pus globules, or the pale corpuscles which are always developed in excess under inflammatory reaction is ever detected in such collections. Every condition, therefore, which characterizes inflammation, is absent, and the denomination which they have received at the hands of most authors, has been well applied.

Lymph Abscesses.

When the collection is perfectly pale or watery, being composed of a dilute serum of the blood alone, it is termed lymph abscess by some authors. The idea, however, that such effusions are necessarily the result of actual lymphatic exhalation, or extravasation, is certainly erroneous. Exactly in the same manner as happens in common dropsies of enfeebled habits, a thin and watery serum can be exhaled from the blood-vessels, into the relaxed parts of cachectic persons, and produce these forms of cold abscesses. It is very rarely, indeed, that a surgeon in extensive practice can meet with a decided effusion from a ruptured lymphatic, among the living parts. The constitution must always then be infirm, or the parts in a state of preternatural relaxation.* The cases which most frequently occur, are those which result from unhealthy suppuration of the lymphatic ganglia terminating in an ulcerative breach in some

* I have seen extensive collections of a watery fluid in the thighs of leucophlegmatic and relaxed subjects, which have penetrated deeply among the muscles underneath the fasciæ. On making deep punctures, enormous quantities of a watery fluid precisely like lymph, will rush out as from a large cavity. These are altogether different from anasarca, and can hardly fail of convincing the practitioner of the existence of lymphatic effusions from a rupture of some of the enlarged vessels. By proper bandaging and stimulating embrocations, with the use of tonics and alteratives, such cases can, in general, be successfully treated. One enormous distention of this case occurred more than two years ago, in a corpulent washerwoman in Carpenter Street. She was a mulatto, of about 45 years of age, but nevertheless she was decidedly leucophlegmatic in her temperament. One of her thighs was prodigiously distended, from the knee to the groin, with a sub-facial and intermuscular fluctuating effusion. She was taken to one of the Dispensaries after I had seen her, and an exploring puncture made through the vastus externus muscle. A gush of lymphatic fluid explained the nature of the case at once, and convinced the pupils that no cerebriform fungus was present.

of the larger lymphatic trunks, and producing a more or less considerable effusion and distention. These are apt to remain fistulous after their discharge, and present a gentle lymphatic oozing for a long time.* Small lymphatic blebs or abscesses sometimes occur at the cicatrix after venesection at the bend of the arm, which evidently result from an unhealed puncture of a lymphatic vessel. They are very easily ruptured, however, by pressure, and continue to discharge the pure lymph *guttatim* for a season. The application of a pointed stick of pure lunar caustic, and subsequent pressure with graduated compresses will speedily obliterate all such discharging orifices. Sometimes congenital fistulous orifices of the lymphatics appear in infancy, and continue for years discharging occasional drops of pure lymph. These especially occur in the neck, along the course of the carotids, and may probably result from an incomplete closure of the lateral openings, found in that region during the earlier stages of fœtal development. The proper treatment is to excite obliteration of such orifices, by the application of a small red hot wire, or a pointed piece of solid caustic.†

* One case occurred to me about ten years ago, in the right arm of a young man just above the internal condyle, in the usual situation of the first brachial lymphatic ganglion. He had been afflicted with a small abscess there about four years before, which left a small fistulous opening, from which a frequent lymphatic oozing occurred. Another, precisely similar, since occurred in one of the forearms of a lady over the upper third portion of the anterior interosseal space, and continued for several months after the partial closure of every small abscess there. In some rare instances, dissection has revealed a very small lymphatic ganglion in that space along the course of the central lymphatics of the forearm. But an abscess on the course of the larger lymphatic trunks will terminate in such orifices, as well as abscesses of the glands.

† Some years ago I was consulted for a case of this kind, in the person of a daughter of Capt. Campbell, of Pine street. She was then about seventeen years old, and rather pale and delicate in her appearance. A very small, and almost imperceptible orifice existed in the skin directly over the anterior margin of the sterno-mastoid, in the middle region of the neck. A common bristle could hardly be inserted into it, and it resembled very closely, one of the empty cutaneous follicles. A very small drop of transparent lymph could almost always be seen over this orifice, and every few minutes it would trickle down like a tear. On rubbing the neck with a slight pressure, especially upwards, this discharge would be considerably augmented; and I took advantage of this to collect a few drops in a teaspoon. The fluid underwent an imperfect or flocculent coagulation, as I have found always to be the case on repeating Magendie's observations upon the lymph when extracted from the vessels of living animals.

Scrofulous Abscess.

Although the characteristic trait of scrofulous abscesses is described as a compound of curds and whey, still there is a considerable variety in the appearance of the collections of matter formed in strumous habits. It is possible for genuine pus to be formed after active inflammation in such constitutions as we have before explained under the head of inflammatory changes in the blood. But more frequently an imperfectly digested and viscous matter is generated, which only remotely resembles pus. Often the same kind of abscesses which we have denominated chronic, occur in scrofulous subjects, especially under the skin of delicate children in the form of the subcutaneous abscesses of some authors. But in general the mixture of serum with curd-like flakes or particles is evacuated from the true scrofulous abscess. The serum is found to contain a less proportion of albumen than that separated from healthy blood, and the curds are supposed by many writers to be composed of coagulated flakes of the albumen of the blood. Some, however, explain the curd-like substance by comparing it to detached portions of the tuberculous matter of scrofula. Others, again, prefer to compare it to broken down and dead coagulated pieces of the fibrin exhaled from the blood upon the lining membrane of the abscesses. It is of no great consequence, however, to determine the chemical composition of these elements, provided we understand the true pathological condition of such abscesses. We know that they all depend upon an enfeebled and unsound condition of the animal economy which requires rectification and support before any true restorative efforts can be effected. We also know that the institution of phlegmonous inflammation will so far alter the composition of the blood, as speedily to enable the capillaries to throw out the reparative elements, and effect a closure and cicatrization of the cavities. The

One of the children of a late Hon. Secretary of the Navy, was born with the same kind of lymphatic orifice in the same region of the neck. When I saw it, the child was about three years old, and the discharge of lymphatic fluid had continued at intervals up to that period, from his birth. As the child was then ill with fever, I did not venture to cauterize the orifice, but suggested the cure to the parents for the consideration of their family physician in a remote State of the Union. That was about five years ago, and I have just met with an intimate friend of the family, who says that the stillicidium of watery fluid still continues down the neck, with occasional interruptions.

opinion of the chemico-physiological investigators, that scrofula depends upon a want of perfect assimilation of the proteinous compounds into organizable corpuscles of fibrin, appears to be so well established, that most practitioners now proceed to that supposition, both in the primary and secondary treatment of the disease. By active exercise in the open air, by a well regulated diet, and by all other means of invigorating the vital forces we attempt to rectify the grand function of assimilation, while we also pay close attention to the means of exciting a development of plastic lymph in the cure of organic diseases which result from scrofula.

The obsolete opinion that scrofula in all its forms, was dependent on a deranged condition of the lymphatic system, led to the idea that all the abscesses which are peculiar to it, must arise from an inflammatory obstruction of the lymphatic ganglia, or, as they were improperly denominated, glands. But the chronic inflammations which arise in the bones and their envelops and appendages, in the cellular tissue and the absorbent vessels themselves, and also in almost every other organized structure in the body, may give origin to scrofulous collections. In the ganglia a deposit of ill-concocted and coagulated albumen under the form of tuberculous substance is first effected, after which an exhalation of serum or sero-purulent fluid supervenes, which more or less perfectly disintegrates the tuberculous matter, and distends the surrounding uncircumscribed parts into an abscess. The same process sometimes occurs in the cancelli of the spongy bones, in and around the lymphatic vessels, and, especially, on the free surfaces of the serous membranes. Detached flakes of coagulated, or imperfectly elaborated fibrin, instead of tuberculous curds, often float away from the walls of these abscesses; and these, when in a disintegrated state, and mixing with the serous fluid, may, sometimes, counterfeit the appearance of an opake and consistent pus. Sometimes, after the supervention of active inflammation, pure pus is secreted in addition to such exudations, and thus every variety of collection may be accounted for.

On the evacuation of such abscesses, their walls, in general, collapse at once, and from the contraction of the surrounding textures, their surface is subsequently so much diminished as to leave a very small extent of parts to undergo the reparative processes of healthy inflammation. When inflammation is allowed to occur in large cavities exposed in this way, the consequent irritation is liable to prove too severe to allow of the proper inflammatory efforts on the

part of the system. A highly irritative and dangerous form of fever will then result, which may rapidly prostrate the energies of life, and prevent all disposition to suppuration or granulation. These circumstances induced the celebrated Abernethy to devise the method of puncturing all large abscesses of this class, whether denominated cold, chronic, or scrofulous, by an oblique direction of a fine trocar or lancet, and closing the orifice with compresses and adhesive plasters, after allowing a portion of the contents to escape. By repeating this operation three or four times, a few days apart, while, at the same time, constitutional measures were employed for correcting the state of the system, he thought the abscess might be diminished, and brought gradually into such a state of tonicity as would allow of a free and permanent opening, and the subsequent establishment of bold inflammation. This plan of treatment has proved so generally successful, that by far the majority of practitioners in this country now adopt it, at least as far as one or two preliminary punctures are concerned. There are not wanting still more careful operators, who are so fearful of the entrance of air into the cavity of such abscesses as to insist upon making the punctures with a narrow trocar, to which a stop-cock and syringe is accurately fitted. The syringe is recommended not only for withdrawing the matter by its pumping action, and preventing the total exclusion of the atmospheric air, but also for insuring the avoidance of injurious pressure and contusion from the hands of assistants in attempting to force out the contents. Mr. Abernethy's method has, however, in general been attended with so little ill success that the mass of our practitioners still prefer it in all large and dangerous collections, without any modification.

Some, however, have repeated and spoken highly of the plan recommended by the Baron Larrey, of opening such abscesses by a red hot lancet, and afterwards insuring the diminution of their size by the application of compresses and bandages. If the abscess, after any mode of treatment, merely contracts into a fistula and refuses to heal, it then becomes proper to inject stimulating washes, such as solutions of nitrate of silver, or mercury, or of the bichloride of mercury, into the cavity, for the purpose of exciting active inflammation and true suppuration. A waxen bougie smeared with some stimulating ointment, or dusted with powdered nitrate of silver, and introduced deeply into the fistula, will often prove more efficacious, however, than injections. When the abscess has undermined a

large portion of the outer integument, and leaves it thin and dusky, it should be treated in the same manner as a broad sinus, or the whole of the detached skin may be cut away, as was originally recommended by Callisen, of Copenhagen. The plan introduced by Crowther, and followed by some of the French surgeons, of endeavoring to disperse such collections by exciting their reabsorption under the influence of counter-irritants, is not often successful in this country. Moxas, potential cauteries, and strong iodine ointment, with blisters, have been continued for a long period in some cases, with only a partial diminution of the size of the abscess.

Abscesses by Congestion, or Traveling Abscesses.

All such abscesses as we have just described, which occur in feeble or unhealthy constitutions, are liable to travel, by the aid of gravity or pressure, through the most lax parts to remote, or even distant regions from their point of origin. The want of adhesive power has prevented the natural efforts from instituting a healthy circumscribing barrier, and thus the matter is allowed to be driven into a distant part, where it becomes congested in the form of what Hunter called an abscess *in* the part, in contradistinction to an abscess OF the part. In this way, abscesses which begin to form in the glands of the throat and neck, often gravitate down under the fascia as low as the clavicle, and sometimes below that bone through the axilla to swell out underneath the scapula.* From the psoas

* Several years ago, I recollect I was called into consultation, on a cold winter's day, by one of the Dispensary physicians, to see a poor Irish child in North Water street. The house was wretchedly dreary and cold, and the little sufferer had been miserably fed and clothed. I found an enormous cold abscess bulging down underneath and below the scapula and the whole serratus major anticus and latissimus dorsi muscles. It extended, also, upwards underneath the clavicle, as high as the mastoid process. After evacuating more than three pints of serous fluid containing flakes of albuminous substance, through an oblique puncture, I detected the origin of the effusion in several enlarged ganglia high up the neck underneath the cervical fascia. By the influence of tonics, an improved diet, warm clothes, and a supply of fuel to the almost frozen family, the child speedily recovered, and the tumors in the neck were dispersed. Several other cases of a similar character, although none so large, have since occurred to me among the poor and desolate of the outskirts of the city. But they do not always travel downwards. I have met with one remarkable case, in which the abscess bulged chiefly upwards and backwards. Mr. Mintzer, the German fancy merchant, of North Third street, had been under the care of a homœopathic practitioner for about three months, for a slowly increasing tumor on his left

and lumbar regions, they often gravitate down into the groin, and even far down the thigh ; and from many of the bones they often progress through a wide extent of parts. An accurate knowledge of the relative anatomy, especially of the muscles and fascia, with all their various attachments and connections in the affected regions, will always enable the surgeon to explain the source and progress of such collections, when they are presented to him in practice. Thus a fluctuating swelling under the fascia on the fore part of the thigh, can be traced up under the femoral arch and the fascia iliaca, to enlarged lymphatic ganglia behind the peritoneum and above the pelvis ; or if a distortion of the spine exists, or dull aching pain, tenderness from pressure, or other signs of caries there are manifest, we follow up the abscess to a diseased vertebra of the loins, or even the back. From the ischiatic notch, or from the side of the rectum, matter may often be traced upwards in the same way. So common is it to detect some high source of the matter in an organic disease of a bone, or of a gland, or viscus, that many surgeons have denied the possibility of a simple psoas or lumbar abscess. But such collections do occasionally form independently of and uncomplicated with any other organic affection than the abscess itself. After evacuating them we sometimes fail in detecting any enlarged gland above, or any symptom of a caries or inflammation in a bone. We have said enough already to explain the treatment of the simple abscesses in any of the regions into which they may have traveled. When they are complicated with scrofulous or other enlargements of the remote lymphatic ganglia, all the remedies for the cure of chronic and scrofulous swellings of these organs, of course, come into action. Alteratives, purgatives, the internal and external use

side, and, finally, sent for me. I found an enormous cold abscess extending from the clavicle, and a little above it, down to the origin of the serratus major, in front and underneath the whole scapula, rhomboidei, and latissimus dorsi, behind and below. It contained more than a gallon of thin puruloid matter, which had become very offensive when I evacuated it by an oblique puncture. Although I repeated the puncture several times, and placed him on a rigid constitutional regimen and treatment, it proved impossible to effect a closure for a long period. Finally, I detected the cause of the effusion in a caries of the fourth rib, just in front of the axilla. A free incision was then made over and along the course of the rib, which was treated with applications of nitric acid and other escharotics, until the whole outer surface exfoliated for about three inches in length; after which occurrence, complete cicatrization was speedily effected.

of iodine, and counter-irritation, all become necessary remedies in such cases, in addition to the topical management of the abscess.

In the same way, when we discover any connection with a diseased bone, whether it be one of the bones of the pelvis, or one of the vertebra of the spinal column, the remedies appropriate to such an affection must be superadded. Of these, nothing is so powerful as the occasional light application of the actual cautery over the diseased portion of bone. The moxa, however, is sometimes preferable, and, in irritable and inflammatory subjects, issues made by the application of potential caustics. Absolute rest, for a long time, on a matress, and sometimes close confinement of the trunk, by means of lateral curved splints, will also be required for bad cases of caries of the vertebral column.

Organic diseases of the viscera, especially of the larger intestinal tube, sometimes give origin to such abscesses.* Lumbar abscesses projecting out behind the loins, or above the spine of the ileum, on either side, sometimes arise from obstructions or perforating ulcers of the colon behind the peritoneum.† These sometimes even gravi-

* My excellent friend, Dr. Samuel Tucker, called me in consultation, some years ago, to see the son of a hatter in Second street, about seventeen years old, who, after being troubled with obstinate costiveness for a long time, and colicky pains in the left iliac and lumbar regions, finally exhibited a deep seated fluctuating tumor projecting out towards the back part of the same lumbar region. I detected an abscess there, and on making a deep incision just in front of the quadratus lumborum muscle, a large quantity of very fetid pus escaped. A large lumbricoidus worm afterwards escaped through the orifice, and the odor of fecal matter for a long time exhaled from it. But, finally, the abscess closed, and the bowels were no longer subject to derangement.

Dr. Charles Schwartz lately called me into a similar case, which occurred in the person of a German tailor, in Race street. After having been ineffectually treated for eighteen days, by a homœopathist, for inveterate constipation and pain in the left lumbar region, which was mistaken for nephritic calculus, he sent for Dr. Schwartz, who at once detected a deep seated tumefaction in that region. He resorted to active antiphlogistics, cathartics, and injections, but could not prevent the tumor from suppurating, although he succeeded, to some extent, in evacuating the bowels. I opened the collection just in front of the anterior margin of the quadratus lumborum muscle, and evacuated a very thick offensive pus, after which the bowels resumed their natural functions, and all the pain subsided.

† Dr. Isaac Anderson, Sr., of Haddington, called me in consultation to the case of Miss Paxson, about ten years ago. She was then about thirty years of age, and had been afflicted for a long time with a tumor upon the ileo-colic valve, which could be felt through the right iliac region, and had been attended

tate down into the thigh or over the spine, so as to appear upon the dorsum of the ileum. They occasionally form in the cavity of the peritoneum itself, and then by gravitating downwards become circumscribed into large collections by surrounding adhesions,* so as

with occasional colic and constipation. Finally, a large abscess formed there, and gravitated down to Poupart's ligament, and backward behind the spine of the ileum. It, finally, bulged over the dorsum ilii, just behind the posterior margin of the obliquus externus, and presented a thin and fluctuating surface there. I punctured it at the thinnest part of the covering just before the posterior spinous processes of the ilium, and an enormous quantity of fetid pus was discharged. A considerable volume of the stercoraceous gases afterwards gushed out of the same orifice, and the pus was afterwards occasionally mixed with stercoraceous particles. The abscess plainly, therefore, communicated with the cæcum or colon, and presented an instance of one kind of perityphilitic abscess. Under the use of poultices and bandages it finally, however, cicatrized, and the patient was no longer afflicted with intestinal obstructions.

* In the year 1825, I was sent for, to introduce the catheter for a Mr. Thomas, in Filbert St., who was supposed to be laboring under a retention of urine. I found him with a large fluctuating tumor in the regio pubis precisely like an over distended bladder, and he complained of all the symptoms of a painful retention. I therefore introduced the catheter, as I thought, fairly into the bladder, but not more than a tablespoonful of high colored urine escaped, and as the symptoms were not at all relieved therefrom, I introduced the left index up the rectum, where I found what seemed to be an enormous distention of the lower fundus of the bladder. On making percussion upon the swelling in the regio pubis, I could distinguish a palpable fluctuation, through the swelling felt in the rectum, and I could not doubt that the bladder was over distended. Still the catheter was in the bladder, and no more urine would escape. On withdrawing the catheter, it was found to be unobstructed by coagulated blood or any other foreign substance. I afterwards introduced a larger one on my next visit, but the same result followed. The next day, Dr. Physick visited the patient with me, and introduced a silver catheter with the same effect. He then carried his left index as high up against the lower fundus of the bladder as possible, and forced up the catheter so as to be certain of its full passage into the bladder. In doing this, he felt some barrier giving way before the point of the catheter, and the patient, at the same instant, cried out that he felt his bladder tearing. On withdrawing the catheter, blood for the first time appeared in its eyes and cavity, and we were persuaded it must have made a false passage. The ensuing day, the doctor repeated the same effort ineffectually with another catheter, and he, therefore, directed me to tap the vesical tumor above the pubes. When I had introduced a trocar, to our astonishment, a sero-purulent fluid escaped instead of urine, and the collection proved to be a large circumscribed abscess of the peritoneum, gravitating down into the cavity of the pelvis, and floating around the bladder, or rather the empty bladder floated within it. In a few hours the man died. He was a young man, twenty-three years of age, the son of Mr. David Thomas, a very respectable citizen. We found, on careful inquiry, that

to present very remarkable and intricate abscesses. No part of surgical practice is more difficult of comprehension, or gives more

he had swallowed a date stone about two years before, and ever after complained of feeling it lodged in his right groin. For about two weeks before I first saw him, he had been attended by Dr. Gillingham for colic and constipation, and after the application of a large blister, the swelling of the lower part of the abdomen had appeared and strangury had supervened. Ineffectual efforts had been made to relieve the strangury, by warm baths and opiates, and Dr. G. was obliged to leave town, when I was called in, on account of his own health. On examining the body, we found a large mass of coagulated lymph, partly organized around the appendix vermiformis, and the veritable date stone lodged within the cavity of the appendix and but slightly projecting into the cæcum. The exhalation of puriform matter had originated there and gravitated downwards. Surrounding barriers of adhesion had formed between the intestines and the lining of the abdominal walls in front, and the abscess was confined to the lower part of the umbilical, the hypogastric, and the pelvic regions. It was the lower part of this abscess which we had felt through the rectum, and mistaken for the distended lower fundus of the bladder. The free serous surfaces, looking into the abscess, were everywhere thickened and opaque, and incrusted with a scaly or broken false membrane of coagulated albumen or fibrin. The injury which the catheter had done to the bladder consisted in the forcing of its point into the orifice of the right ureter, where it had torn up the mucous membrane to a considerable extent and allowed some of the urine to infiltrate under it, so as to puff it up like a blister.

About seventeen or eighteen years ago, Prof. Mitchell, now of the Transylvania University, was attending with two other physicians, a man in Wood St., with a strangulated scrotal hernia of the left groin. They succeeded in partially relieving the symptoms, but could not reduce the tumor, and I was called in by them, to perform the necessary operation. The relative anatomy of all the external parts was found to be correct. I cut through the superficial fascia, then through the thickened cremaster and its addition of columnar fascia, and finally through the thickened peritoneal sac. But lo! an immense gush of sero-purulent matter flowed out and no hernia was to be found. After full twenty ounces of the discharge had escaped I introduced one index finger, and felt a cul-de-sac above circumscribing the matter, but did not dare explore further. In two days the man died, and a post-mortem examination explained the case. The hernia had receded, but remained partially incarcerated within a loop of the omentum, exactly as is depicted in one of Scarpa's plates. A scrofulous or chronic inflammation of the omentum and noose of the ileum had followed, effusion had taken place, and the matter had been circumscribed as it gravitated down into the hernial sac and lower portion of the peritoneum just above.

My distinguished friend, Samuel George Morton, M. D., called me in last August, to consult upon a similar case, which occurred in the person of the late Charles Graff, Esq. Mr. G., then sixty-two years old, had been afflicted with a large femoral hernia of the right side for many years, which no kind of truss could ever restrain from descending. About a fortnight before I saw him, an induration or tumor had formed about the ilio-colic valve, and a very obstinate colic and con-

trouble to general practitioners than this of circumscribed cold abscesses of the peritoneum.

stipation supervened. Notwithstanding he remained constantly in bed, the hernia would frequently be forced down by a troublesome cough, and require replacement. On the third or fourth visit, which I paid to him, I began to perceive a fluctuation in the groin, extending down from the tumor, about the colic valve, and shortly the hernial sac became distended with the matter, and the hernia no more descended. Fluctuation could then be communicated by percussion from the fore part of the thigh, underneath the whole femoral arch up to the seat of the valve. As the colicky obstruction still continued, we concluded to open the abscess on the thigh, by an oblique puncture at first. A prodigious quantity of purulent matter gushed out, indeed it spurted out at every impetus communicated by the cough. We endeavored afterwards, to close this aperture against the admission of air, but we could not succeed. So incessant were the pressure and escape of the matter, that we were obliged to apply poultices and favor its constant discharge. The tumor about the ileo-colic valve afterwards greatly diminished, and the obstruction of the bowels totally subsided. An obstinate diarrhœa set in with hiccup and exhaustion, and in spite of every attention, the excellent old gentleman expired in his sixty-third year, twelve days after the puncture of his abscess.

The late Dr. George S. W. Riter, of Roxborough, was for many years before his death, afflicted with an induration of the parts around the ileo-colic valve, which would occasionally produce dangerous obstructions and then remit by terminating in a dysenteric diarrhœa. In one of his attacks, a large distention of the right iliac fossa occurred, which finally fluctuated most distinctly, and induced me to recommend the puncture. But the doctor was then excessively irritable and timid, and deferred the proposed operation from day to day, until finally the abscess gravitated down to the bladder and penetrated its cavity. The matter was discharged along with his urine. The abscess closed soon afterwards, but the bladder never recovered from the injury it had received. He was ever after liable to attacks of difficult micturition, and finally died from marasmus.

Miss J., aged twenty-two years, from Dauphin county, Pennsylvania, had been confined to her bed for many weeks with a severe pain in her lumbar region, which I attributed to dysmenorrhœa and uterine irritation. But she was also excessively costive, and for a long period no purgative could be made to take effect. Enemata alone succeeded in partially evacuating the bowels. Finally an abdominal tumor was found in the regio-pubis which gravitated down behind the bladder and uterus. Repeated consultations were held with two eminent accoucheurs, both of whom thought the tumor arose from the uterus. One thought it proceeded from a twisting or doubling of its enlarged body backwards, and the other supposed it to be a scrofulous tumor growing from the body of the organ. Finally, however, it turned out to be a circumscribed abscess which projected into the rectum and into the vagina behind the uterus. Before I could persuade her to allow me to puncture it with a trocar, through the rectum, it burst into the intestine and discharged a purulent fluid for several days in succession. The intestinal obstruction was overcome for months in consequence, and she appeared to have entirely recovered her health and strength.

To render it more clear than any general description can possibly make it, a detail of several illustrative cases will be given in the subjoined foot notes to the text.

ULCERS.

So much has already been said, and necessarily too, upon this subject under the head of inflammation and its various terminations, that all the general principles connected with its treatment have almost been exhausted. Ulceration, however, when long continued in the form of an open sore upon the outer surface of any part of the body, becomes a very important consideration in the mind of a practical surgeon. It produces great distress and frequently an entire inability on the part of our patient, for the performance of the ordinary duties of life. Such empirical and inappropriate treatment is, however, so often witnessed by the public that the old women and quacks frequently supersede us in the practice. Professional men have too long been in the habit of looking upon ulcers as beneath their notice; and hence the pupils of the present generation have not been properly instructed in regard to the management of this important class of diseases. Perhaps the confusion and want of agreement in the nomenclature, as it has been adopted by different writers, and the complicated and ingeniously devised attempts at discrimination between the different species of ulcers, have been influential in diminishing all interest in regard to the subject. A very slight reflection, however, upon the character of the cases as they actually appear to us in practice, will enable us to present all the forms of ulcers under such a simple classification as can be readily understood by the pupil and encourage him to master all the details which will qualify him for professional duty. The natural arrangement consists, first, in healthy ulcers and all the modifications which they undergo in sound constitutions, and second, morbid ulcers

A year afterwards, however, the disease reappeared with nearly the same symptoms, and she was equally fearful of my renewed proposals to abridge her sufferings by a puncture with a trocar. The walls of the abscess again gave way, but into the upper and posterior portion of the vagina instead of the rectum, and she is again restored to perfect health.

Mrs. Y., of Bucks county, was the subject of a similar attack some years before, but the abscess originated from a caries of one of the lumbar vertebræ, and appeared at the left groin before it burst into the vagina.

according as they are influenced by the unhealthy condition of the system in which they occur.*

1. *Healthy Ulcer.*

All those ulcers which follow or result from phlegmonous inflammation in sound constitutions, and which secrete laudable pus, while they are at the same time forming small firm and florid granulations, are said to be simple or healthy in their character. The preceding inflammation has always been subdued by the discharge of pus, and the efforts of nature are then solely directed to the processes of reparation. The progress of cicatrization over the surface of such ulcers, as soon as they have been filled up to the level of the surrounding skin, has already been fully explained. All that we now have to say, therefore, is in connection with the proper mode of dressing them so as to obviate the influence of interfering circumstances over their cure. Nature herself will often do better than when tampered with by the injudicious efforts of some practitioners. She will often desiccate the animal fluids with which the surface is first besmeared into a pellicle or scab, under the protection of which a rapid cicatrization will often be effected. It is only when the natural scab becomes too thick so as to be pressed upon, or disturbed by motion and friction, that it fails of promoting a cure. This circumstance, however, unfortunately too often occurs, and then the matter continues to form underneath its unyielding cover, and produces the same injurious disturbance and ulceration as when confined in an abscess. After softening and removing the scab, in case it proves thus injurious, by an emollient application, it is the custom of most surgeons to cover the ulcers with some soft cerate or plaster to protect it from the irritation of the atmosphere, and the friction of clothing, until cicatrization can be effected underneath. Care, however, should be taken not to employ too confining or adhesive an

* It is perhaps necessary to caution the reader against confounding the terms ulcer and ulceration with each other. Although an ulcer is frequently the result of ulceration, still when once in a healthy condition it becomes a very different affair. The processes of morbid absorption and inflammatory disintegration, which constitute ulceration, have then altogether subsided; and the reparation, nay, even the addition of new matters or parts, is going on to effect a cure. Ulcers, moreover, often occur after wounds and injuries without being either preceded or accompanied by any degree of that morbid action which we call *ulceration*.

application which may resist the free discharge of the pus from the sore. A large undivided piece of adhesive plaster, or a stiff cerate spread on rags and bound on the ulcer by a bandage and compress, may both produce the same injurious effect as a thick and unyielding scab. The pus must always be allowed to escape as it forms, and on this account many surgeons always prefer soft cerates spread on lint, or emollient poultices until the cicatrization has been perfected. These, however, are liable, after a long continuance, to produce relaxation and flabbiness of the granulations, and consequently to delay cicatrization. The plan most approved of here has been to apply long strips of adhesive plaster spread on muslin, each from half an inch to one inch in width, and drawn side by side across the ulcer with sufficient firmness to make considerable pressure, and with a hair's breadth interval between each strip so as to allow a free escape of the pus. A soft compress of lint spread with simple cerate should be laid over the outer surface of the plasters and confined with a few turns of a bandage. This dressing favors the discharge of all superfluous matter through the interstices of the strips of plaster into the soft lint which absorbs it, while a steady pressure is constantly made by the strips and bandage to maintain the tone of the granulations and keep them down to their proper level. In case of ulcers of the lower extremities, this is especially the favorite plan of treatment with us, because it frequently allows the patient to stand and walk about in attendance upon his daily avocations. It is substantially the same plan which was described by many writers about a quarter of a century ago under the name of Baynton's method.

A variety of other methods are, however, still in use; and all of them, under favoring circumstances, do certainly succeed, and often as rapidly as the one we have now recommended. The water dressing used by Mr. Liston, is often followed here as well as in London. It consists in applying a piece of soft or patent lint of the size of the ulcer, or rather a little less, dipped in tepid water, to the granulations, and over them a piece of oiled silk somewhat larger, and bound down by a bandage roller. The oiled silk prevents evaporation, and maintains the animal temperature under the circumstances most favorable to rapid cicatrization. This dressing answers admirably for ulcers on the head, trunk, and upper extremities, but it does not allow of sufficient pressure on the surface of the lower extremities of patients who cannot be confined to their beds.

The plan recommended by Mr. Higginbottom, has also been very often successfully employed in small ulcers of the body, and upper extremities. It consists in gently brushing over the surface of the granulations with a stick of lunar caustic, so as merely to coagulate the mucus over them, and then applying a piece of gold beater's skin, which, of course, answers the purpose of a very thin scab. Whenever the granulations have been too much irritated by exercise, the light application of lunar caustic every day or two, will contribute amazingly towards alleviating irritability, and restoring tone in them under any mode of dressing. Dry lint over the centre covered by oiled silk, or adhesive plaster, is also a good application in many cases. So is the ointment of impure oxide of zinc; also red precipitate, and a number of other corrective salves, spread on layers of lint, under varied circumstances of protracted ulceration from previous ill management. But care should always be taken, after all these modifications of treatment, to allow of the free escape of pus whenever it is formed, and to avoid the irritation of motion and exercise as much as possible, during the cure.

2. *Inflamed Ulcers.*

Notwithstanding the fact to which we have already alluded, that the suppuration of ulcers always relieves the inflammation which may have caused them, it often happens that new, or returning sources of irritation, will reproduce the inflammatory action. Frequent disturbances of an ulcer, by motion or friction, or highly injurious applications, and severe constitutional excitement from the operation of almost any cause, may easily convert a healthy into an inflamed ulcer. The granulations then immediately disappear, and the surface becomes raw, and puffy, and bloody. A sanies instead of pus is discharged, in a state of commixture with the disintegrated granulations and edges of the sore. The surface and cavity rapidly extend by renewed ulceration, instead of contracting. The surrounding integument becomes hot, and red, and painful, and so does the edge of the ulcer. The constitution becomes deranged with fever and obstructed secretions, and sometimes more or less sloughing results from this cause around and upon the surface of the sore.

Nothing can be more simple than the treatment of this condition of an ulcer. All we have to do at first, is to reduce the inflamma-

tion by proper local and constitutional measures. Neither general nor local blood-letting will often be required. Saline purgatives, combined with antimonials, rest, elevating the portion of the limb or part affected, fomentations and light emollient poultices of slippery elm bark, or other mild applications, will speedily allay the inflammation, and reproduce the healthy state of suppuration and granulation. The same treatment which is applicable to simple healthy ulcers will again come into use. Sometimes, however, after one or two such vicissitudes, the condition of the sore becomes weak and flabby. The granulations are large, pale or dusky, instead of being florid and small; and every appearance of languor in the actions is then presented. The favorite measure is then to apply some stimulating wash or ointment, in addition to the bandaging with strips and compresses. The sulphate of copper, or of zinc, or of iron, dissolved in camphor or creasote water, and applied by moistening a layer of soft lint under the other dressings, will often answer perfectly. Tar ointment, creasote ointment, or gall ointment may also be applied in the same way, with great advantage.

3. *Irritable Ulcers.*

After repeated inflammations, produced by carelessness or bad practice, especially in intemperate constitutions, it often happens that the ulcer becomes irritable. The edges then appear jagged or serrated, and elevated or everted. The surface loses all appearance of granulation, and assumes an angry hue of dark and red colors intermixed with irregular pits or depressions and elevations. The discharge becomes thin and acrid; and sodden flakes of grayish fibre or dead lymph adhere in patches. But the irritability which characterizes these ulcers is chiefly marked by incessant pain, often of the most intense and burning kind, and excessive tenderness under contact with foreign substances. Irritative fever always results on the part of the constitution, and the most restless, unquiet and unhappy state of the feelings that can possibly be conceived of by the observer.

The first thing which is to be done in such cases is to alleviate the constitutional irritability, which is best effected by purgatives in the morning and full doses of Dover's powder and calomel at night. Sometimes hyoscyamus and camphor attended with cathartics answer the best purpose. If the febrile heat be high and lasting, antimonials with diluent drinks will be necessary. As to the local treatment, there

can be no doubt of the propriety of commencing with warm fomentations of decoction of poppy leaves, of chamomile flowers, or of milk and water, as most surgeons have recommended. Either of these can be applied by squeezing a large sponge repeatedly dipped in them over the ulcer, suspended over a tub or wash-bowl. Some prefer a dilution of two drops of pure nitric acid in an ounce of water for this purpose. Then moisten the whole surface with a weak solution of lunar caustic (six grains to the ounce) in warm water. Follow this with a soft poultice of the slippery-elm bark or scraped carrots, and you will be able to overcome the irritation in a very few hours. By moistening these applications with a strong solution of the sulphate of morphium (ten grains to the ounce) we often gain considerable advantage. An immense variety of empirical combinations have been recommended by different practitioners for alleviating the pain and irritability of these ulcers, but according to our experience, nothing can be half so certain or successful as the above course. After the healthy condition of suppuration and granulation has been restored, any mild astringent or corrective, aided by the support of strips and bandage, will speedily effect the cure.

4. *Indolent Ulcers.*

In elderly laboring people ulcers of the lower extremities are very apt to become chronic and indolent, especially after long neglect or repeated attacks of mismanaged inflammation. The edges and surrounding integument become very thick, smooth and indurated or callous from deposits of organized lymph in the interstices of the skin and subjacent cellular tissue. The surface is smooth and glossy, or covered with an adherent, sodden or unorganized lymph, and discharges nothing but a viscous fetid ichor; the surrounding skin is dusky and discolored by the congestion or chronic inflammation of the cutaneous vessels. The whole surface is so torpid and insensible that the subject of it generally ties upon it an old filthy rag, and walks about without any inconvenience. It is generally during the winter season that such cases occur to us in practice, because the poor generally then retire into the almshouses or hospitals for treatment.

The way in which our hospital surgeons formerly managed these ulcers in their ordinary state, was to commence with blistering the whole surface, or destroying the callous edges by the knife or escharotics, and then to cleanse the parts effectually, by a few applications

of some emollient poultice. Then finely levigated calomel or red precipitate was dusted over the surface, and the strips and bandages were firmly applied, according to Baynton's method. Care, however, was always taken to apply the bandages over the whole of the parts below, so as to make equable pressure from the toes upward, and to maintain the limb for some days afterwards in an elevated position. The daily use of the blue pill or calomel, followed by purgatives, was also enjoined, to promote absorption of the callosities, and favor the return of granulations. Some practitioners are very much addicted to the use of red precipitate ointment, verdigris, or other stimulating cerates spread on lint, and applied underneath the strips of adhesive plaster. In many obstinate cases, however, more powerful stimuli are required to promote absorption of the indurated deposits, and restoration to suppuration. Sometimes it is even to destroy the whole surface by a thorough application of the vegetable caustic before we can produce a healthy action. This is merely imitating the natural way in which severe inflammation excited in such ulcers by injuries or intemperance, often throws off the whole of the callosities by a superficial sloughing. Soft poultices will then speedily be followed by healthy suppuration and granulation, and the ordinary methods of treatment can soon effect a cure. We need hardly say that in old gouty, or plethoric persons, it is improper to cicatrize such ulcers perfectly, unless we substitute a discharge from a seton or issue in a more convenient place. The dangers of apoplexy, or of some other internal disease of repercussion, are always apprehended from the entire suppression of old suppurations under such circumstances.

5. *Varicose Ulcers.*

Either of the two last species of ulcers may be kept up for an indefinite period of time, by the remora of blood in varicose veins leading from them, or from the parts around them, in the lower extremities of adults and aged persons. There is no special modification presented in the character of such ulcers, however, except that the surrounding parts are more puffy and discolored from the congestion of venous blood in the dilated vessels, and that small knots or tubercles are felt under the skin, in the form of what are called phlebolites, or vein knots. Formerly surgeons were in the habit of extirpating the varicose trunks of the veins above the ulcers by operations of various kinds. They either excised them, or tied

them with ligatures, or divided them by subcutaneous incisions. Sometimes they even destroyed them by the direct application of actual cauteries. Such operations, however, so often terminated fatally by the occurrence of phlebitis, that of late years milder methods have been resorted to for the purpose of exciting an obliteration or closure of the varicose trunks above and around the ulcer. The most available and successful of these is the method devised by Velpeau, which consists in running fine needles under the veins, and through a small portion of the skin pinched up along with them, and applying a twisted suture so tightly as to excite inflammation and ulceration. When the ligature and needle come away, the vein is always found to have become closed by adhesions, and the branches below speedily afterwards contract, and leave the ulcer free from all varicose complication. But after all such operations the same care, with tight bandaging and other dressings, is required for a very long time, as if no attempt at a radical cure had been made. We may take it as a decided point in surgery, therefore, that in general, the palliative practice of mitigating the symptoms of varicose ulcers by mild dressings, and equable compression of the whole member, from the toes upwards, to some distance above the disease, is the most rational, and the one which in the end will prove most satisfactory to the patient. If no competent dresser can be kept in attendance to apply the muslin roller every day over the limb, it will be best to direct a laced stocking to be made of elastic materials, of sufficient firmness to maintain constant compression upon all the veins. It is only in extreme cases of varicose enlargement where the palliative treatment cannot be made to render the patient comfortable, that operations for obliteration or eradication of the veins can be considered as at all justifiable. We will next proceed to speak of such ulcers as are rendered scrofulous by peculiarities of disease in the constitution.

6. *Scrofulous Ulcers.*

From what has already been stated in regard to the state of the constitution in connection with scrofulous abscesses, we must be prepared to understand all that is necessary to be premised in explanation of scrofulous ulcers. The system being weak and imperfectly supplied with organizable fibrin, all the actions of inflammation and ulceration will, of course, be feeble and indicative of the chronic form of the disease. The ulceration is usually preceded by

an induration of the subcutaneous cellular tissue, which is generally attributed to a tuberculous formation either on the lymphatic ganglia, or vessels immediately below the skin. This induration often agglutinates whole clusters or masses of the ganglia or vessels together, and then increases and inflames in a slow chronic way. The skin becomes discolored and tender, and pits under pressure, in spots or detached spaces, and finally an imperfect suppuration takes place there. The collections take place not within, but around or in front of the ganglia constituting small *periadenic* abscesses. The skin over the parts becomes attenuated and purple, or reddish-blue, and finally it gives way in spots, thus forming a collection of small undermined flabby ulcers, with thin bluish edges. The exposed surface presents no appearance of granulations, but is of a soft reddish, or a grayish pulpy aspect, and is overhung by the attenuated and undermined integument around. After the ulceration has progressed to a considerable extent, until it has thrown several of these orifices into one of larger size, it often happens that granulations begin to form, but they are always pale, and weak, and redundant.

The proper local treatment of these sores consists in the prompt destruction of the whole surface, and of all the undermined portions of integument by strong caustic potass fully applied, and followed by emollient poultices of flaxseed, or slippery elm bark. The application should be repeated from time to time, if any reappearance of undermining, or attenuation of the edges of the skin occurs, until finally the whole presents a sound and healthy aspect of granulation. The application of soap cerate, or Turner's cerate upon flakes of lint bound down by straps, compresses, and bandages, will then effect a cure. But great attention should at the same time be paid to the state of the constitution. Alteratives and tonics and well regulated diet, and all such exercise as can be taken in the open air, without irritating the ulcers, should be resorted to, and persevered in, until the cure of the case.* If the constitution is not

* In the case of R. R., Esq., whom I attended in the summer of 1845, with Dr. S. G. Morton, for a cluster of small gregarious periadenic abscesses in one of his groins, which had originated from the sympathetic irritation of an injury to the great toe of the same foot, an extensive undermining of the purple and attenuated integument occurred over each collection. As these gradually ulcerated open, the overlapping edges were occasionally pared away with scissors, or burnt away with caustic potass, and a variety of appropriate dressings

improved, at the same time that the ulcers are cured, the local disease will be sure to return on the first exposure to any exciting cause; nothing can be more reprehensible than the treatment of such cases, by overdosing with the preparations of iodine. The system is often rendered excessively irritable, and the sores exasperated by the fashionable plan of pushing iodine in all cases to the full capacity of endurance on the part of the stomach. If it be given at all, it should be given only in the small and alterative doses, and then in combination with mercurials, or iron.

7. *Phagedenic Ulcers.*

As the etymology of their name indicates, these ulcers spread or extend in various directions by a corroding or eating process of morbid ulceration. In febrile and irritable conditions of the system, such as occur after the morbid effects of mercury and other pernicious influences, a very painful species of phagedenic ulcer is often presented to us in an acute form, resembling in many respects the irritable ulcer which we have already described. The pain is gnawing or biting and pungent. The edges and surrounding parts are angry and inflamed—with a jagged or serrated and uneven border. The base is raw and bloody and uneven, with irregular depressions and elevations as if gnawed out by insects. After this acute state of ulceration has been subdued by antiphlogistics, emollients and sedatives, the ulcer, if not speedily destroyed by strong escharotics applied over the whole surface, assumes a chronic form of phagedenic extension. It either very gradually undermines the edges all around, and presents a worm-eaten base and sharp everted overhanging edges, or it heals on one side and extends on the other by a superficial ulceration. The latter variety finally assumes a crescentic form, and sometimes travels to a considerable distance under the form of what has been called the horse-shoe ulcer. Such are

were applied. Incessant attention was, moreover, paid to the action of alteratives, tonics, and regimen. But as the patient was of a scrofulous and delicate temperament, it proved impossible to excite healthy suppuration and granulation, until we sent him out of town, to take a ride every day. He rode in a light open carriage, about six miles, to the Blue Bell tavern every evening, and returned to his house in town the next morning, for a week, and then healthy pus and sound granulations formed over the whole surface of the ulcers, and then cicatrized perfectly in a fortnight. The exercise produced healthy inflammation, and the consequent development of fibrin.

very apt to form on the shoulders, breasts, and arms of patients whose constitutions, originally strumous, have been irritated by repeated courses of mercurials improperly administered for suspected syphilis.* They also occur among the sequelæ of one of the genuine forms of syphilitic disease, as we shall explain under the proper head when we describe that disease.

The efficient method of treatment in all cases of phagedenic ulcers, consists in promptly destroying the whole of the morbid surface and its edges by the action of caustic potass, and following that application for a few days with emollient poultices to cleanse off the sloughs. If only a portion of the edge is extending, while the opposite side is healing, as occurs in case of the horse-shoe form of this ulcer, the potass should be rubbed over the morbid edge alone, while the sound part of the edge and surface should be left untouched by it. As soon as the parts have become clear after two or three repetitions of the poultice, the best application is Turner's cerate spread on a piece of linen or lint, and bound down by adhesive strips and the roller.

* I have met with several singular cases of cutaneous disease in the same kind of constitutions which bear a resemblance to the crescentic phagedena. A highly respectable gentleman of the bar had been treated by Dr. Physick and others for a suspected syphilitic taint early in life with protracted courses of mercury. He was for years after subject to a pale attenuation of the skin on his arms, shoulders and breast, which would assume a crescentic or horse-shoe form and extend in patches to a considerable distance from the points of commencement. On one arm two of the patches traveled quite around the circumference and left the trace of its progress for life. The disease appeared to consist in an interstitial absorption of the entire parenchyma of the cutis vera with the corpus papillare and the rete mucosum. The coloring matter was also entirely removed. Nothing but a thin and pale cicatrix appeared to be left in place of the original sound skin. Dr. Physick had repeatedly cauterized the extending edges with lunar caustic and nitric acid in the course of his treatment. Two of this gentleman's sons and one of his daughters presented cases of troublesome ozænas, and herpetic eruptions of the skin and in the mucous membranes of the mouth and lips during their childhood: and one of the boys, when he grew up, applied to me for an increasing crescentic patch of snow white skin on his left forearm about two years ago. I have met with several other cases of a similar character in cachectic habits, which had always been attributed by other physicians to an obscure, syphilitic taint. The preparations of sarsaparilla, with corrosive sublimate, or arsenic have generally been prescribed and sometimes with success. At least the patients have not returned to me after receiving such prescriptions.

8. *Sloughing Ulcers.*

There is a considerable variety in the characters of sloughing ulcers occuring under different circumstances and in different states of the system. It is possible for healthy ulcers to slough under the occurrence of intense causes of irritation, even in the healthiest constitutions. We have already spoken of the disposition of old indolent ulcers to slough off all their indurations or callosities after contusions upon them, on the excitement of active inflammatory action from intemperance. But all such forms of sloughing are to be treated on general principles and in fact rectify themselves in a short time under the simplest applications. In a very few hours the sloughs are discharged and leave behind a healthy suppurating surface. Under the head of mortifications we have discussed the subject of noma or sloughing of the jaws and cheeks, and hospital gangrene also included some varieties of the sloughing ulceration. But these are peculiar morbid sores occurring from the operation of contagions which excite ulceration and sloughing in combination or alternation with each other, and therefore deserve consideration under a separate head. The malignant pustules which result from inoculation with glanders, from the poisoning of animals who die of the milk sickness, and from other morbid animal poisons, may be associated with this subject of inquiry. But the blue and livid tubercles which sometimes result from a malignant species of syphilitic inoculation among filthy and intemperate prostitutes, and speedily break open into offensive and painful sores which slough from day to day, and rapidly extend to the entire destruction of the affected organs and sometimes to large masses of the trunk of the body before terminating in death, are the important cases to be regarded in our history of the treatment. No matter whether Mr. Carmichael be regarded as right in his conclusion, that such cases are the specific primary sores of the tubercular syphilis of his classification, or the opinion of those be preferred who insist that such cases are merely the result of the modifying influence of bad habits and broken-down constitutions, the practical course will be the same. It will not do to wait for the slow operation of constitutional treatment, and the soothing effect of emollients in the management of such a terrific disease. The morbid actions must be at once subverted and the disease be converted into a healthy ulcer, or the most devastating ravages will ensue and the most deplorable forms

of constitutional infection be endangered. The sure plan of treatment is to build up a barrier of stiff basilicon ointment on the sound skin around the sloughing surface; and, after removing the fluid sanies by pressing a soft slough upon it for an instant, to apply patent lint soaked in pure undiluted nitric acid over the whole surface.

The slough which follows this severe application will soon cease to be painful, and will be detached in three or four days, under emollient poultices, to the revealment of a clean, healthy and suppurating surface. If any repetition of the sloughing should occur, the same remedy a second time employed, will be sure to overcome the morbid actions and convert the part into a perfectly healthy ulcer. The same treatment which we have recommended for healthy ulcers will, of course, become applicable to every case under these circumstances.

9. *Specific Ulcers.*

In regard to ulcerations from the irritation of poisons, whether they result from any of the forms of syphilitic or other species of virus, the general rule is always to destroy the whole surface by the impression of an active caustic whenever the entire mass of diseased structure can be reached by a single application of the remedy. In thin or superficial surfaces, the mild application of lunar caustic will answer every purpose;* but in those specific forms of ulcers which affect the parts to a considerable depth by induration or any other mode of contamination, either the nitrate of mercury, the chloride of zinc, nitric acid, or caustic potass, becomes the preferable eradicator. It is necessary to use a caustic of sufficient power to destroy all the affected substance at once, if we think it at all de-

* In almost every ulcer of the throat or fauces, as well as in cases of ulcers of the mucous membranes in general, the best of all applications is an occasional touch with the solid stick of pure lunar caustic over the whole surface. It not only alleviates the irritability of the parts, but by coagulating the mucus over them, it creates a protective pellicle that answers every purpose of a dressing over ulcers of the outer integument. This application should be repeated every day or two, or as often as the coagulated pellicle disappears. A solution of nitrate of mercury is used very generally for this purpose by some surgeons, but I have always had such good success with the lunar caustic application, that I have never been tempted to look for a better remedy. It is not necessary to speak here of the appropriate constitutional measures which should be resorted to in the different forms of syphilis or other general diseases.

sirable to overcome the local disease. Mild poultices or cerates will afterwards serve to detect the sloughs and promote healthy suppuration and granulation. If the ulcers be accompanied by deep and extensive deposits of morbid structures below and around, as in most cases of carcinoma and cerebriform fungus, it will be absurd to attempt to convert the surfaces into healthy sores by caustics of any description. Palliative treatment to the ulcers is the only one we can resort to, unless we think it proper to extirpate the whole of the diseased mass involving the open surface by a surgical operation.

BURNS AND SCALDS.

No modest and conscientious teacher of surgery can undertake the discussion of this subject, without encountering feelings of perplexity and embarrassment. If he pays a proper degree of respect for the opinions of others, he will meet with too great a variety of contradictory statements and practice, and if he entertains a respectful notion of his own judgment, he will find himself in opposition to that of others from whom he would dislike to differ. Hot and cold, stimulating and sedative, or even antiphlogistic remedies have been recommended with equal zeal and confidence for every species of burn and scald. Drying and moist, oily and watery, astringent and relaxing applications have all been placed in opposition to each other by different practitioners, without any exception or limitation. In fact, the whole profession was at one time almost wholly divided between the opposite schools of Sir James Earle and Mr. Kentish. The advocates of the first gentleman went for cold water in all cases, while those of Mr. Kentish's plan gave no quarter to any other application than the hot terebinthinate ointment of their leader. We will endeavor, however, to reconcile these apparent discrepancies, as far as possible, by a careful consideration of the different forms and conditions of burns, and ascertain whether experience will not justify us in adopting a considerable diversity of treatment as the cases may occur to us in practice.

In the first place, burns and scalds differ in their degrees of local severity, as well on account of the extent of the surface which they affect, as the constitutional impression which they create. From the mildest cases which appear in the form of a simple erythema, and terminate without any organic or constitutional derange-

ment, in a speedy resolution, up to the horrible cases of actual combustion of the solids, terminating in sudden prostration and death, we have every variety and degree, presenting all possible states of derangement, although gradually verging into each other. Authors have assumed two different bases for their arrangement of burns into species. One class prefers to look towards the kind or form of inflammation which attends each case. Thus, we have 1st, erythematic burns; 2d, vesicating burns or scalds; 3d, ulcerative or suppurative burns, (the phlegmono-suppurative of the Germans;) and 4th, the sphacelating burns, which are attended with sloughing of the skin at least. The other division is founded on the anatomy of the affected tissues, according as they are more or less deeply penetrated by the injurious cause. Some writers have attempted to multiply these with unnecessary minuteness, by attributing a species to each of the four layers of the skin and even to the parts beneath it. The value of this mode of distinction can be understood, without entering into a more careful consideration of the particulars. But these are not the only circumstances which are calculated to modify the treatment of burns in different cases. The constitution is affected in various forms, and often is thrown into opposite states by even similar burns, according to their greater or less extent over the surface. The smaller burns or scalds, even when they penetrate deeply into the tissues of the skin, generally excite the powers of the system into a sudden inflammatory reaction, which, although tumultuous and fluctuating in its character, still resembles true symptomatic fever. The more extensive burns, however, although not deep, prove sufficient to overwhelm the energies of life and sink the system into sudden coldness, torpor, and prostration. Every shade and variety of constitutional, therefore, as well as local derangement, may be expected in the different cases of burns, as they are met with in practice. In one case there will be an immediate sympathetic disturbance in the lungs, attended with difficult and hurried respiration; in another an effusion in the brain attended with delirium or coma, stupor and prostration; in a third, there may be convulsions accompanied by screaming and indescribable agony. Now it appears obvious, that such a diversity of forms must afford a sufficient foundation for a great corresponding diversity of practice, and we may be allowed, therefore, to entertain a more charitable opinion than others have professed of the want of conformity in the doctrines of our faculty. At any rate, vulgar empiricism can gain

but very little advantage from a full history of all the peculiarities of burns. No sensible practitioner can ever adopt a remedy from general recommendation. Its application must always be qualified or restricted to a particular form or condition of the injury to render it acceptable to his judgment.

For the simple erythematic burn, which constitutes the first species of some writers, almost any local remedy will answer, provided it relieves the disagreeable sensation of heat and the accompanying redness. The case will be relieved, no matter hardly what is done. This fact affords a very reasonable explanation of some of the diversities and otherwise unaccountable contrarieties in the mode of dressing burns proposed by different authors. If the good nurse applies lead water, or any other soothing and evaporating lotion, and continues it for a reasonable length of time, the irritation will be completely subdued, and the process of resolution effected. On the other hand, if the theoretical practitioner, governed by the Brunonian doctrine of the gradual subduction of stimuli to prevent the occurrence of indirect debility in the reddened parts, recommends the application of heat in a moderate degree, the excessive irritability will soon be worn down to the mitigation of all pain and even uneasiness. The vulgar will explain the fact by the supposition that heat extracts heat, or that the hair of the same dog cures; but still the result will prove the same, and the patient will get well to the confusion of all narrow philosophy.

In the second species, that is in vesicating burns, however, a more careful discrimination is required in the selection of the appropriate topical applications, as well as in their subsequent management. If the elevated cuticle be roughly handled, or if drying or adhesive applications of any kind be too early or carelessly removed, the burnt surface will immediately become excoriated, raw, and excessively irritable. A vastly worse condition of things will, indeed, be thus produced, than if the parts had been left to the unassisted efforts of nature, under full exposure to the atmosphere. The cuticle should, if possible, be preserved under all circumstances, because it affords the most natural and unirritating protection to the inflamed surface below. If it appears wholly unbroken, so as to retain the exhaled serum in the form of a bleb, careful punctures should be made with a fine lancet or needle, to evacuate the collection with as little admission of air as possible. Then any soft and mild application which will exclude the access of the atmo-

sphere and maintain the whole surface in a comfortable and equable temperature for a long period, without the necessity of frequent changes, will answer every practical purpose. A thin layer of soft carded cotton, moistened with diluted alcohol or common whisky, and bound on tightly by a few turns with a roller, to prevent friction and uneven pressure, has, in general, proved the best application over the undetached cuticle. The temperature of the whisky can be managed so as perfectly to accommodate the sensations of the patient, and should always be maintained at the thermometrical point which proves most soothing or comforting to the burnt surface. The great point to be attained is to preserve a constant equilibrium of temperature and feeling. Frequent fluctuations in either of these conditions will induce reactions, and augment the inflammation to the point which will terminate in ulceration, or even sloughing. Under such treatment the albumen or lymph of the fluid effused under the cuticle, will steadily coagulate, and form not only a protective pellicle, but a new cuticle over the whole surface, and then the disease is cured. But other soothing and mild applications will often do as well as this which we have recommended. Soft unguents spread on thin linen rags, or unirritating mucilages repeatedly brushed over the parts, will serve every useful purpose, provided they are kept constantly moistened at the comfortable temperature, and under them the same reparative efforts of nature will readily be effected. The best general rule a surgeon can adopt, when he is called in to manage such a case, is to let the dressing which has already been applied alone for a few hours, at least, provided it proves agreeable to the feelings of the patient. Every change will do harm under such a condition, and prevent the formation of the defensive pellicle which we so much desire to establish.

In the third species, *i. e.*, of denuded or excoriated burns, much greater care is required in the selection of proper applications. This will especially be the case if the original intensity of the heat has been so great as immediately to destroy every appearance of the cuticle. The soft and pulpy mucous layer, and even its minute capillary vessels, are apt to be removed along with the cuticle, leaving the excessively tender papillary surface of the true skin exposed to the contact of every irritating impression. If the outer superficies of the cutis vera happens to be burnt off, as often occurs from a contact with heated solids, then the raw and exposed extremities of the interstitial nerves and vessels will become as sus-

ceptible of irritation as the corpus papillare itself. But, although it must be admitted that the less deeply penetrating burns will do better under the same treatment than the more profound injuries of the layers of the skin, still the same kinds of soothing and protective applications are proper in all these forms. In general, all cold, harsh, and irritating applications should be avoided in these raw burns. Mild mucilages or liniments of a lukewarm temperature should first be applied, and continued till some degree of fibrinous effusion, or even coagulation, has been effected, over the exposed surface. The infusions of quince seed, of flax seed, or of slippery elm bark, have each been employed with great advantage over the excoriated surface immediately after the injury. The liniments of lime water and linseed, or olive oil, emulsions of oil and the yolk of eggs, fresh and sweet cream, scraped carrots, potatoes, lily root, and other such mild vegetable preparations, have all been used in the same condition and for the same purposes. In some cases the sensation of heat is so distressing, that they must be employed cool, and be maintained in that state by frequent renewals. After a few embrocations, or rather fomentations, of the surface, with such applications dipped or brushed over it by means of a soft feather or fine rag, it is best to resort at once to the flakes of carded cotton soaked in diluted alcohol, as before recommended for the second species of burns. Some surgeons prefer a previous washing with a dilute solution of lunar caustic, to coagulate the exhaled fluids more completely into a protective pellicle, and to still further allay the local irritation. Some, moreover, prefer a weak solution of the chloride of lime or soda, to the diluted alcohol, and very high authorities are in favor of diluted spirits of ammonia. The moistened cotton, however, is certainly preferable to linen rags as a vehicle for either of those solutions; it is softer, makes a more equable and absorbent covering, and allows of a more perfect application of pressure from the bandage. By keeping the cotton envelop constantly moistened with the appropriate fluid in each case, and attending to the selection of a comfortable degree of temperature, we shall be possessed of a wider range of local remedies than after the choice of any other dressing. Certainly cases differ much in regard to the degree of temperature and stimulation which may be required, and this method affords almost every conceivable kind of advantage in these respects. There have been a number of other dressings, however, in great repute in this city at different periods

within our recollection. A plaster of litharge boiled down in linseed oil to the consistence of an ointment, and spread on kid-skin, was, for a long time, the favorite covering of burns in the practice of Dr. Physick. The basilicon ointment, rendered more or less stimulating by the addition of due proportions of spirits of turpentine, was, for many years, the regular prescription of the majority of our faculty in Philadelphia. In fact, Mr. Kentish had the honor, at one period, of having converted almost the whole profession to his views, in regard to the treatment of all burns. If, after any of the above-mentioned applications, a coagulation of the pale corpuscles of fibrinous matter on the burnt surface happens to be effected, it is possible for speedy cicatrization to occur without any degree of suppuration or ulceration. Even after entire destruction of portions of the skin, reparation may be effected under such moist and protective dressings, according to Mr. McCartney's modeling process. Very remarkable cures have been witnessed in this way, under circumstances where it appeared almost impossible that any kind of recovery could take place.

In the fourth species, *i. e.*, in the sloughing or carbunculous burns, emollient poultices are infinitely the best applications. They soothe the pain, allay the inflammation, and promote the necessary suppuration and detachment of the sloughs, much more effectually than any other plan which has been tried. Perhaps the warm water dressings, now so fashionable in Europe, may afford some advantage in very extensive burns of this class, especially as the warm water with which the lint is moistened, may easily be impregnated with antiseptic and anodyne combinations. The oiled silk envelop will retain the moisture and temperature to the point which promotes comfortable sensations and suppuration, especially if it be occasionally supplied with external warmth by means of flannels wrung out of hot water. In the latter stages of suppuration, the use of basilicon or Turner's cerate, flavored with creasote, will prove excellent remedies to restrain excessive discharges, and give tone to the granulations.

The Constitutional Treatment of Burns.

Since the publication of Sir Benjamin Travers' excellent work on constitutional irritation, great attention has been paid to the sympathetic effects of burns. It has been generally decided that extensive scalds which excoriate the chorion, prove more disastrous

than the severest burns that penetrate more deeply into the integuments. The explanation of this admitted fact is derived, not only from the greater extent of surface usually affected by scalds, but also from the increase of irritability of merely exposed over destroyed sensitive surfaces. No instance of a patient recovering, after being wholly immersed in scalding liquids, has ever been recorded, whereas prodigious burns, followed by extensive losses of the soft parts, have been recovered from with but only an inconsiderable disturbance of the constitutional forces. Scalds of some parts of the body, again, are infinitely more injurious to the system than when they occur on others. In the trunk, especially on the chest, they prove vastly more dangerous than on the extremities. Very few recoveries are effected after extensive burns on the thorax or abdomen, while it is very common for much more extensive denudations of the skin over the members to do well. No doubt the internal organs sympathize much more fully with burns of the trunk than of the extremities. Burns of the head and neck are by no means free from a similar complication. The membranes of the brain and its interior substance, the spinal cord, also, and its greater nerves and membranes, all become suddenly injected after severe scalds and burns. The serous membranes of the chest, and sometimes that of the abdomen, become irritated by virtue of a similar reflection of the irritation of burns. Such internal irritations may either excite violent constitutional reaction, as they often do in the first stage, or by yielding an early effusion into the internal cavities or interstices, they oppress the vital forces and speedily destroy life. Sometimes the reflection of the irritation is propagated from the skin to the mucous membranes, and then we have a more protracted and less dangerous form of constitutional disturbance. In very extensive and severe burns the violence of the shock upon the nervous system almost immediately destroys life, before any degree of reaction or propagation of irritation to the interior organs can occur. The sufferers sometimes die in ten or fifteen minutes after being taken out of scalding liquids, and many become cold and pulseless immediately, and die within a few hours without any reaction. More commonly, however, they react temporarily, and after a short tumultuous struggle with pain and excitement, they sink into coma, convulsions, and fatal exhaustion. Fortunately, in the milder and more common cases of burns, the depression from nervous shock is only temporary, and the reaction is more regular and durable.

By attending strictly to the state of the constitution at each period of change, and meeting the exigencies as they occur, we can do a great deal, not only in the way of controlling the general derangements, but also in rectifying and improving the condition of the burnt surfaces under the protection of the appropriate dressings.

After the full discussion of the subject of shock and constitutional irritation in the earlier pages of this work, it will appear superfluous to dilate at much length here upon the modification of those states produced by burns. We may observe, however, that in the primary and secondary conditions of prostration from very severe cases, the stimulating plan of treatment will become absolutely necessary. The same care should be taken not to push it to the extent of exciting too high reaction on the one hand, or of oppressing the exhausted powers on the other. Moderate excitation by small quantities of brandy with gruels, given in successive doses alternately, with a few drops of aromatic spirits of ammonia, will, in general, be the proper course. The moment reaction occurs, all such stimuli should be discontinued, and, if necessary, moderate antiphlogistics or refrigerants substituted in their place. If severe pain arises, the salts of morphium may be given internally, in combination with diaphoretics. Spasms and restlessness are to be relieved by the same means. Whenever the symptoms of cerebral or thoracic irritation arise, in connection with vascular excitement, they must be combated with topical depletion and evaporating lotions. In general leeching to the temples and nape, or to the epigastrium, will prove sufficiently powerful. It will rarely be necessary to resort to venesection, and then only to a moderate extent. The sudden and tumultuous excitement of the blood-vessels under reactions from burns, rarely generates the excess of fibrin which enables the system to tolerate large losses of blood, and sustain the active reparation of injured parts. Laxative doses of blue mass, or calomel, with rhubarb and aloes, or common enamata, will, in most cases, enable the refrigerative lotions and cooling drinks to reduce all over-excitement. Whenever a disposition to coma is manifested, opiates should be administered with great caution, and then only in combination with ipecacuanha or antimony. It is generally best to allay the pain and spasms, and morbid vigilance, by injecting small doses of laudanum, from time to time, into the rectum, according to the views and method recommended by Dupuytren in traumatic delirium. Gruels and broths, with farinaceous articles of food, con-

stitute the best nutriment until the stage of exhaustion from excessive suppuration approaches. Then, of course, tonics, malt liquors, and animal food, become necessary.

A great deal can be done in the way of regulating the degree of constitutional reaction and excitement by a proper management of the topical dressings. The local action of stimuli on the burnt surface will often produce more effect than the internal administration of the most potent medicines. By adding warm alcohol with kréosote or turpentine dissolved in it to the moistened cotton envelop, we can rouse the sinking powers. The strong Kentish ointment really proved exceedingly useful in desperate cases of prostration on the same principle.* On the other hand, whenever we perceive

* Mr. Mellvain, in his recent work, suggests that the turpentine under any form of combination, may prove useful as an application by its sympathetic influence over the kidneys. The secretion of urine is almost always defective, and sometimes morbid after burns. In severe cases of shock it is sometimes totally suppressed, and continues so until the death of the patient. I have repeatedly known it to continue for three entire days, and I always hail the return or increase of its secretion as a favorable omen. Mr. Mellvain's suggestion is very reasonable, particularly as he has had abundant opportunities of witnessing the influence of turpentine even when externally applied upon the kidneys. "To show you how extraordinary an influence certain excitement of the kidney may have on affections of the skin, I will tell you one example where the remedy employed, though not turpentine, was prescribed on a principle to which I conceive a portion, at least, of its beneficial operation in burns is to be ascribed.—A woman came to the dispensary with a large superficial ulceration on the left leg, completely occupying the whole limb from the knee to the ankle. She was desired to rest, poultice and attend to her diet and bowels. I was talking of sympathy to two gentlemen at the dispensary, when the next patient happened to be this old woman, æt. seventy-two, and in explaining how they should examine cases, I said, 'there now is a case which, from the large surface affected, and from what you know of burns, would suggest the probability that some of the parts which sympathize with the skin will here be well marked. Now,' said I, 'first try her alimentary canal.' Her tongue was not healthy, nor much otherwise; appetite good; and bowels regular. We then inquired as to the kidney. We found that she made a very small quantity of water indeed; and that, generally, very thick; but every now and then she made a considerable quantity of pale urine. I ordered her to omit all the medicine and take simply a diuretic (the nitrate of potass with squills). The next time I saw the woman you may judge my surprise at finding the whole of this immense surface had healed in one week, the kidney acting naturally. Soon after this the leg became uneasy, when it was immediately relieved by the same measure. I say, then, use Dr. Kentish's dressing if it be at hand; if not, content yourself with the adoption of the principle, so far as the means in your possession will allow."—*Med. and Surgery*, London, 1838, p. 510.

that any local application is productive of great pain and burning of the injured part, in connection with high constitutional reaction, we should immediately withdraw it and substitute some milder and cooler dressing, before resorting to any kind of general depletion.

The exuberant granulations which arise on the ulcerated surfaces after burns, should be restrained by pressure, combined with styptics or astringents. An occasional application of lunar caustic, or of the sulphate of copper, followed by a plaster of zinc or verdigris ointment, will ordinarily prove efficient in this respect. Great pains should always be taken to prevent opposed surfaces from cohering, and, if possible, still greater to obviate the disposition of the cicatrix to contract and deform the affected part or member. Long after the parts have healed, indeed for months, a difficulty will be experienced from this source. Not only posture and position should be attended to in every condition of the patient, but rigid confinement of the parts in an opposite direction to that which is endangered by the contraction of the scar, should be enforced for a long period by the use of appropriate splints and bandages.

THE EFFECTS OF COLD.

From what has been said of mortification from frost bite, we have to deviate a considerable proportion from this chapter upon the effects of cold. As we then observed, it may now, however, be again stated that the injurious consequences of this agent upon the animal economy, are rarely immediate, but almost always the indirect results of the subsequent influence of other causes. Cold is said by some merely to debilitate the system, or the parts upon which it operates, so as to render them less able to endure the subsequent actions, whether induced by internal or external causes. Hence mortification, or chronic inflammation and ulceration are supposed to occur in consequence of an enfeebled power of resistance, as well as of sustaining action. Cold, however, does not always act as a debilitant. It only temporarily allays excitement in most instances, and whenever suddenly applied or speedily withdrawn, it almost always proves highly excitant to the powers of life. The doctrine of Brown, therefore, was much more consonant to the whole outline of phenomena in relation to cold than the notion of debility. The accumulation of excitability which he attributed to its influence upon the

system and its parts, although he viewed it merely as the absence of the stimulus of heat, accounts more satisfactorily and generally for the connection of the phenomena than any other hypothesis. All the deranged or morbid actions which follow changes of temperature, are more clearly traceable to an alteration of the vital properties than to any debility of them. The idea which we attach to the term weakness in a state of health has hardly any correspondent in the condition of disease. While some parts act with less vigor, others are performing extraordinary duties; and it is this very want of equilibrium in the actions which in general constitutes disease.

When cold is allowed access to any particular region of the surface of the body or extremities, it operates variously, according to all the circumstances which at the time exist. A merely transient application is generally followed by an immediate reaction, which exhibits itself in a healthy and temporary form of vascular excitement. A protracted influence of the same agent, by disturbing the equilibrium of the nervous and circulating powers, sometimes throws the system into a state of fluctuation or disorder, which the universal application of cold over the whole surface, would fail to do. The circulation being driven from the chilled part, accumulates in the others; and often a remote part, being in a state of predisposition to disease, or, as some will say, debilitated, will become congested in consequence, and finally inflamed. Although the internal parts often become diseased in this way, by the general influence of cold repelling the blood from the whole surface, still derangements of this kind, from a partial application of the agent, are more common. But the violent and disordered reactions resulting from the too sudden restoration of heat after previous exposure to cold become the most frequent causes of disease. As we have explained this point so fully under the head of mortification, we need only add here that almost all the catarrhs and symptomatic inflammatory fevers of our climate arise from this source. Every experienced and careful observer into the philosophy of things, slowly approaches the fire after a cold ride, and the judicious physician always throws off his warming envelops on entering a heated apartment. Unfortunately, however, but few people can be induced to pursue so prudent a course. Few persons contract a cold, which means an internal inflammation, from the indirect influence of cold, while hardly one avoids it, by the simple exercise of his common sense.

But vascular excitement and inflammation, are not the only effects

of the original application of cold. This influence does not always prove merely sedative to the nervous ramifications through the parts which it reaches. It frequently produces an altered, if not an augmented state of irritability, or, as Brown would say, excitability in the texture, or organs involved. What traveler in a railroad car has not complained of a stitch, or a pain in the shoulder, or neck, exposed to a broken window on that ride; and, how few delicate and sensitive invalids there are who are not always troubled with pains in their limbs, or cramps in their muscles, after a ride in a cold atmosphere, or a walk upon the damp pavements? Such affections are often, indeed generally, unconnected with any accompanying, or consequent inflammation; and the inference of Brown was, therefore, fairly deduced, that the protracted operation of cold is followed by an accumulation of excitability. The occurrence of pains and spasms, independently of all vascular excitement under such circumstances, proves that the nerves affected by a previous diminution of temperature, must have acquired an increase of susceptibility to impressions. This is the character of all such constitutions as have been frequently affected by previous catarrhal and rheumatic attacks. The chronic or neuralgic rheumatisms with which they are said to be troubled, are only the results of the accumulated excitability of Brown from the effects of cold, rendered permanent by frequency of repetition. But we must not allow ourselves to dwell upon such matters as have no intimate connection with surgery. Although there are some important points to which we could allude concerning the relative effects of cold, according as the system has been previously exposed to a higher or lower degree of temperature, we must pass on to the consideration of pernio, or chilblain.

All chronic inflammations of the skin which result from the effects of cold upon the surface of the exposed parts, whether about the countenance or extremities, are called chilblains. We cannot fail to understand their pathology, when we recollect that perverted vascular action can easily be induced in parts where the nerves have been thrown into a state of chronic derangement or irritability from the injurious influence of cold. Although delicate and infirm persons are most liable to the depressing effects of cold, as it readily produces the shriveling and benumbing of the tips of their exposed surfaces and extremities, which predisposes to chilblain, still they will not be troubled with the actual development of disease if they do not expose themselves to the influence of subsequent reaction

from heat. Since the general introduction of warm air into our public and private buildings from cellar furnaces, chilblains have almost disappeared from this city. The tips of the ears, nose, eyelids, lips, and chin, were always inflamed by too sudden an exposure to the full blaze of a chimney, and the toes and fingers were constantly frost-bitten or irritated by a close approach of these parts to a hot grate or stove. Almost every sufferer from such indiscreet exposures is now acquainted with the appropriate remedy. The moment the chilled part begins to be afflicted with itching, burning, and tumefaction, it is plunged into cold water, or rubbed with snow until the irritation is subdued by a consumption of the accumulated excitability. If such treatment be neglected, the irritation will soon increase to an intolerable pruritus or sense of burning heat; the surface will become purple or livid, and vesications will begin to form. The surface beneath the vesicles, instead of cicatrizing, will become raw and irritable, discharging a thin and watery ichor, and preventing all exercise of the affected member. In some cases the inflammation will pursue a more chronic course. The skin will remain of a dark red hue for weeks without vesicating, but will finally dry and crack, and the fissures will afterwards become converted into troublesome ulcers.

The remedies for chilblain when it has actually been formed, are as various and opposite in their character as those which have been recommended for burns. Indeed, the same pathology prevails, and will serve to explain them in both forms of local disease. When the vesicated or ulcerated surface is very painful and hot, the use of cooling and emollient applications is unquestionable. The emulsion of slippery elm bark, or of flaxseed, combined with lead water, cold cream and a watery solution of morphium, the scraped pulp of various roots and vegetables, and all other such mild and soothing applications will, also, prove exceedingly palliative. But the moment the inflammation has been subdued, some mild astringent or corrective application should be employed, to modify the diseased actions and promote sound cicatrization. For this purpose a variety of active stimuli have been recommended by some practitioners. Terebinthinate and resinous combinations, solutions of the metallic salts, and alcoholic solutions of cantharides, and even with corrosive sublimate, have all had their share of credit. The best application, however, is the lunar caustic applied either in a strong wash of thirty grains to the ounce, or brushed in the solid form every

day or two over the morbid surface. Blacking the dry and scaly cuticle, also, over the inflamed and unvesicated chilblain, will speedily alleviate the irritation, and enable any mild defensive plaster to effect a cure. The peritoneum, or skin as it is called, of the fat over a sheep's kidney, wore constantly over the surface, especially under cool linen or cotton stockings, generally proves the best protective in the way of a plaster. The great point is to keep the part as cool as possible, even in cases where we have to apply stimulating washes and dressings. Caloric is the real poison of frost-bites and chilblains in every stage and condition.

WOUNDS.

Although all our cutting operations terminate in the formation of wounds, we only treat, under this head, of such open divisions of the soft and hard parts of the body as are produced by accidents or injuries. These are properly classified according to the character of the instrument which produces them, because the shape and constitution of the penetrating substance will cause a corresponding modification in the condition of the wounds. A sharp cutting instrument will divide the parts with the least possible degree of mechanical injury, and leave the opposite sides in the best condition for speedy and perfect reparation. As the incised wounds made in this way are attended with no tearing or bruising of nervous and cellular parts, they not only excite less irritation to the constitution, but they are healed with much less danger of inflammatory action than either of the other kinds which we shall have to describe. But the same circumstance favors the discharge of blood, for smoothly divided vessels, whether small or large, have no mechanical barriers naturally supplied to their free evacuation. This constitutes the first and almost the only difficulty which we have to encounter in our treatment of incised wounds. In general pressure, the access of cool air, cold water, alcoholic and styptic washes will soon check the oozing from small vessels; and even when persevered in for a short time, they will often excite contraction sufficiently to obliterate the orifices of arteries which throw out blood in a stream. In cases, however, involving vessels from the size of the smallest probe up to any larger dimension, it is never safe to depend upon such expectant or temporizing measures. The ex-

perienced surgeon immediately inserts a small pointed tenaculum through the bleeding orifices, or seizes them with a pair of spring forceps, and secures them with a small ligature of waxed silk or linen thread, tied underneath the instrument. One end of the thread is then cut off close down to the knot, so as to leave as little bulk of foreign substance within the cavity of the wound as possible. After waiting a few minutes longer until the oozing of blood from the minute vessels ceases, he clears away all the coagula, and sponges out the fluid blood before closing the wound. The edges are approximated, and kept closely in contact with long narrow strips of adhesive plaster, drawn at right angles across the line of junction, with small interstices left between for a free escape of the fluids and exit of the ligatures. The nearest extremity of each ligature should be brought out through the nearest points of surfaces between the strips of plaster. Although ligatures always prove somewhat irritating, and excite some degree of inflammation in their track, they can in general be brought away in from one to four days by slight traction through the interspaces of the plasters, provided they have been properly applied around the mouth of the vessels alone. It is better practice to ensure all the inconveniences of the ligatures than to encounter the risk of exciting a greater degree of inflammation by the use of irritating styptics, for the purpose of arresting hemorrhage from large vessels.* After the plasters

* It was Dr. Physick's practice, in all deep incised wounds, to leave a small strip of lint or linen rag in one angle between the lips, or to bring it out with the ligatures through one of the interspaces between the plasters, so as to ensure the free discharge of the blood, and of the subsequent serous effusion. In the dressing of very large and fleshy stumps, this often proves an excellent precaution against the conversion of the cavity of the wound into an abscess. But, in general, the water dressing will prevent the necessity of this contrivance. One great advantage of the wet or moist treatment is, that it allows of a constant drain of all the early discharges from the wound; and especially if the closure of the edges is not effected after some delay, while the cold water is steadily applied to prevent oozing, there will be every certainty of a firm union of the interior parts of the surfaces. A great advantage of the water dressing is, that its temperature can always be accommodated to the condition and sensations of the patient. If he be robust and plethoric, and liable to high vascular excitement, the cold water will reduce the irritation, and prevent inflammation. On the other hand, feeble and irritable patients, who become chilly and nervous after wounds, or operating, can be fomented with warm water, and afterwards dressed with warm water, to the great relief of their sensations and comfort of the wound.

have been applied, a layer of patent lint, wet with cold water, may be bound down upon them by a roller. The constant moistening of this dressing by a sponge will cause all the advantages of the cold water dressing, as all the expelled fluids will constantly be attracted out from the cavity of the wound through the interspaces between the strips and the pores of the wet lint and bandages. As the strips of adhesive plaster will not be loosened by the moisture, and can be kept on for many days after repeated changes of the external dressing, they are calculated to answer as good a purpose, in most cases, as even the so much lauded isinglass or court-plaster of Liston. The isinglass plasters, although dissolved in an alcoholic menstruum, and spread on translucent silk, for the purpose of enabling the surgeon to inspect the condition of the wound from time to time through the coverings, are not so well calculated to resist the loosening influence of moistures as well made adhesive plasters. It must be confessed, however, that the water dressing is not required in all cases. In small wounds, unattended with hemorrhage, the dressing with dry lint and bandage, called the dry dressing by some surgeons, will answer perfectly well, and then the isinglass strips will afford a neater covering than anything else which has ever been devised. Some practitioners, however, have preferred the simple dry lint placed immediately in contact with the closed wound, and bound on by a bandage, without the intervention of any kind of plaster. This absorbs the blood, and coagulates it, like a protecting scab, over the lips or edges of the wound. This was the favorite blood dressing of the pupils of Hunter, which they thought more in harmony with the flesh than any other, and which has been often called Sir Astley Cooper's plaster for wounds. Certainly when no evaporating lotion is required to keep down inflammation, as occurs in very small and shallow wounds, unattended with hemorrhage, this dressing will answer every desirable purpose.

Notwithstanding the recent advances of microscopic physiology, the doctrines of Hunter in regard to the healing of wounds have undergone but very little change. He established the opinion that the simplest and most perfect kind of union can be effected without any degree of inflammation. His union of wounds by the first intention, consisted in the agglutination of the opposite surfaces by means of an exceedingly thin stratum of blood, which coagulated between them and bound them together like the fine glue between

layers of veneered wood in the hands of the mahogany manufacturer. Whether this living coagulum became not only the bond of union but the medium of mutual inosculation between the opposed surfaces, by its own inherent powers of organization, as he supposed, or as a matrix or nidus for the nearest vessels to pullulate through, as Bell and others imagined, it is not now necessary to inquire. Nor is it necessary to decide whether it remains permanently as the living bond of union, or becomes reabsorbed so as to allow the vessels directly to inosculate with each other without any intervening medium. We know that no inflammation need occur to effect this simplest kind of union, and we also know that to insure adhesion by the first intention, not only every foreign matter, but, also, the blood itself, should be left in as small a quantity as possible between the sides and edges of the wound. Only a sufficient portion of blood to stain the surfaces of the wound was supposed by Hunter to be necessary for this union. All that can be seen, either in a fluid or coagulated state, should be wiped away or extracted before closing the wound. The same view is to be closely observed in the subsequent management of every case. The dressing is always to be so applied as to promote the free escape of all the blood that may afterwards be effused between the surfaces from the smallest vessels. The advocates and opponents of the Hunterian doctrine upon this subject, have equally proved themselves ultra partisans in their zeal for argument. While those who deny the vitality of the blood, insist upon it that no proportion of this fluid can ever promote the union of wounds, and that it must be wholly absorbed before any part can reunite; the other party refuses to allow that any quantity of living blood can ever prove injurious within a wound. The opponents deny the possibility of reunion, under any circumstances, without inflammation, and they assert that in the union by first intention, the process is so low that its symptoms cannot be distinguished. The advocates of Hunter, on the other hand, frequently proclaim their opinion that inflammation never can occur, if the blood which is interposed between the sides of a wound only remains alive. Its excess will then always be reabsorbed, leaving a sufficient quantity to coagulate and become the final bond of union. The late distinguished Professor Dorsey used to relate, in his public lectures, cases in which he thought he had seen the entire coagulum filling the cavities, left after the extraction of molar teeth, become organized and converted into sound gums and mu-

cous membrane. John Hunter, himself, saw coagulated masses of blood becoming organized in the interior cavities of the body, and his relative, Sir Everard Home, demonstrated the process under a microscope, by which this organization became effected. We have discussed this subject before, under the head of granulations, and explained how far the cell-doctrine may be considered an improvement upon the notions of Hunter. As we then asserted, the coagulating lymph is the true element of reparation of wounds, as well as of almost every other species of organization. The entire mass of the blood does not go to the consolidation of any divided parts. While the other constituents are undergoing absorption or drainage, through the lips of a wound, the fibrinous portion of the blood coagulates upon the surfaces, and becomes the actual bond of union. No matter whether this has proceeded from the first effused blood in this way, or from a subsequent exhalation under the lowest stage of adhesive inflammation, it equally serves the purpose of a plastic organization.

This last observation naturally leads us to speak of the second stage or form of union in incised wounds. When the divided surfaces are large and deep, or whenever any considerable degree of motion has been allowed to disturb them, or irritating and styptic washes have been applied to check the hemorrhage before dressing them, union by first intention cannot take place. Some degree of irritation must then necessarily occur. The edges become slightly red, tumid and itching, and an exhalation of pure fibrin is thrown out into the cellular interspaces and over the surface of the wound, which agglutinates the parts together and becomes the bond of union. Now John Hunter called this union by adhesive inflammation, which process he considered to be the first stage of inflammatory action. Later inquirers, however, have caviled upon this point; and, attempting to dive more deeply into the consideration of the essential nature of disease, some have asserted that union by first intention is a still earlier stage of inflammation, although not appreciable by our senses; while others have maintained that even this union by the medium of fresh exhaled lymph is not the result of any degree of inflammation. True inflammation, according to the latter class of logicians, only occurs when a higher grade of excitement has arisen to the full development of morbid heat and pain and redness. They will have it that union by fibrous effusion as well as by bloody agglutination, is always effected without any development of inflam-

mation. Their conclusion decidedly is, that the surrounding active vascular excitement and local congestion which are preparatory to suppuration and terminate in that process, are the only conditions which deserve the name of inflammation. But this is after all only a dispute about words. The facts remain just as they were under the admirable elucidation of Hunter. Divided parts can reunite themselves by the thinnest possible stratum of fresh blood without any distinguishable form of inflammation: again they can be reunited by a slight effusion of the pure coagulating lymph under the influence of a very moderate increase of vascular excitement. If this latter condition is not to be called adhesive inflammation, it may be designated by any other epithet which can be applied to it by the most refined criticism, and still the doctrines of Hunter will remain uncontroverted. In the same manner we may consider the lately introduced nucleated cell hypothesis, as highly ingenious in itself, but not at all calculated to advance our knowledge beyond the views of Hunter. It is of very little consequence to the progress of sound pathology, whether the coagulating lymph repairs wounds by the action of the pale corpuscles of which it is chiefly composed, or by virtue of powers inherent within itself.

If great care be not taken in very large and deep incised wounds, to prevent motion and retention of the fluids, suppuration will inevitably take place instead of adhesive reparation. This will especially be the case whenever ligatures have been applied on the orifices of bleeding arteries, and necessarily left within the wound. It is always possible, however, to limit the process of suppuration to a very small portion of the cavity, just along the track of the ligatures, while all the other parts of the surfaces are made to cohere by the plastic effusion of fibrin. All we have to do to accomplish this purpose, is to maintain the surfaces in close apposition by means of the parallel strips covered with wet compresses of lint, until some time after the ligatures have been loosened and withdrawn. The use of poultices is exceeding improper under such circumstances, because they will insure suppuration throughout the whole extent of the wound. Keeping down the temperature by means of the evaporating lotions, and allowing the discharges a free vent through the dressing, will enable us to conduct the largest incised wounds through the processes of consolidation in the shortest possible space of time. The great extent to which subcutaneous sections or incisions can be carried in the division of tendons, fascia, and muscles

without involving any danger of suppuration, should always encourage us to persevere in effecting a reunion of every incised wound by the same low degrees of inflammatory action.

Lacerated wounds differ from incised, chiefly in the condition of their respective surfaces. The tearing of the different tissues, instead of a smooth division of them, leaves the opposite surfaces more unequal and less adapted to that perfect coaptation of them which is so necessary to union by first intention. The skin, the fascia, the nerves, vessels, and cellular substance will be torn apart at different places from each other, and they will moreover be likely to contract unequally, or rather retract themselves in opposite directions. The direct irritation upon the nervous and irritable parts will also be much greater in lacerated wounds inasmuch as the mechanical injury to the textures is much greater than in a simple division of them by a smooth cutting instrument. Hence a sufficient degree of vascular action to transcend the proper stage of bloody adhesion almost always arises, and the reunion by plastic exudation must be chiefly aimed at by the surgeon. There is one advantage, however, in the natural condition of laceration of a wound; the blood-vessels being torn, along with the investing cellular tissues around them, a ragged fringe will be present over their orifices which will afford a mechanical barrier to the oozing of blood from the smaller, as well as a direct impediment to the impetus of a stream from the larger vessels. The lacerated vessels also contract and retract more than in incised wounds, being themselves within the torn fringe of cellular substance, which speedily becomes consolidated by a coagulation of the first infiltrated portions of blood. It has been ascertained that coagulation takes place within torn and ragged cellular substance the instant blood comes in contact with it, and thus a covering stratum is promptly formed over all the orifices of the contracted vessels in lacerated wounds. Subsequently a coagulum forms within the mouth of each vessel, of any size and taper, to a conical point up to the commencement of the nearest collateral branch. By these means the oozing of blood from such wounds, is not only prevented, but also in many cases all hemorrhage is checked even in the larger arteries. The famous case of the miller, published by old Cheselden, whose arm was torn off at the scapula without a particle of hemorrhage, has since been repeatedly witnessed by other respectable authorities in surgery, and now no one can doubt the wonderful powers of the animal economy in the way of protecting itself from

death by losses of blood.* But the point to which we wish to direct attention in connection with this subject, is the counter balance which this want of hemorrhage affords to the impediments we have mentioned, to the easy separation of lacerated wounds. There being no danger of subsequent oozing and forcing of the parts asunder from this source, the surfaces can be kept in very close contact by the dressings and thus adhesion promoted, notwithstanding the greater irritation and inequalities of which we have spoken. In

* A great difference, however, must be anticipated between the hæmostasis in open surfaces after the entire loss of parts by laceration, and the partial laceration of wounds in limbs, which preserve their vitality below the injured part. In deep lacerations of the groin and axilla, for instance, the hemorrhage will only cease during the state of syncope; the moment reaction takes place in the parts below the wound, hemorrhage will be forced out from the veins, at least by the returning or venous circulation. Graduated compresses, therefore, should always be bound down upon the orifices of the large vessels and especially of the veins during the state of prostration from fainting, although while we are present there may be no appearance of bleeding. I shall mention an important case of this kind under the head of gunshot wounds which occurred in the groin at the Southwark riots. A case also of the kind occurred in the person of a gentleman in this city about six years ago. His right groin was caught by a large blunt iron hook in a horse-mill, and he was dragged rapidly round the area by it, until a monstrous rent was torn across and just below Poupart's ligament, laying bare the femoral vessels and nerves. The artery was completely denuded, and the vein torn across. A prodigious venous hemorrhage had taken place when I got in, and to my astonishment I found a medical gentleman attempting to take up the artery, although no blood flowed from it. He did succeed in taking up the femoral artery, but as I felt upon the torn vein, making pressure there to suppress the venous hemorrhage, I could distinguish the pressure of the circulation from below, which no doubt was supplied by the collateral arteries. We were still obliged, therefore, to fill the wound with graduated compresses, and to bind them down by the thick bandage. The result was, that the enormous wound finally healed, and the gentleman eventually got well, although in the mean while the leg mortified and was amputated just below the knee. Now it is an interesting point to decide, whether the ligature around the main artery, which I supposed to be unnecessary and would have opposed, had I been consulted respecting it before the operation, was the cause of the mortification, or whether, as was inferred by some, it was not rather calculated to prevent that unfortunate occurrence. The latter class of my friends considered that the destruction of the great vein at the groin would have caused too great a congestion of venous blood in the parts below, unless the corresponding artery had been also obstructed by the ligature. But other veins, as well as arteries, might have become dilated in the meanwhile, as indeed they must have done to some extent, because the vitality of the whole knee and parts above was preserved.

fact, it is very doubtful whether union by first intention cannot sometimes be effected in such cases. Certainly it is a common thing to succeed just as well in establishing adhesions by the exhalation of plastic fibrin as in incised wounds. The moist or water dressing is, however, more generally preferred for the purpose of keeping down inflammation to the adhesive grade, and in consequence of the obliquity or irregularity of the edges, many surgeons prefer to commence the dressing with interrupted sutures. Unquestionably, however, it is best to avoid the bloody suture in all cases if possible. It is only in such wounds as exhibit a disposition to inversion of the edges under the apposition by adhesive strips, that the interposition of a few stitches between the different strips is ever necessary.

Contused wounds differ from lacerated, chiefly because the part first stricken by the wounding body is so far disorganized by the bruise or contusion, as necessarily to undergo a loss of its vitality. This will have to be ulcerated or sloughed away before any reparation can be effected, and, therefore, inflammation is supposed to be necessary to the full grade of its positive development. The practice, however, which many surgeons recommend in such cases, of immediately poulticing for the purpose of favoring suppurative inflammation and granulation, is injudicious, because it insures suppuration throughout the whole extent of the wound. The contusing body, or resistance which causes the wound, generally acts more or less obliquely, and tears up more flesh than it actually contuses. The consequence, therefore, is, that most of these wounds present more lacerated than contused surface, all of which can be repaired by the process of simple adhesion, if it be dressed in the same manner as we have recommended in cases of common lacerations. The moist or water dressings will allow the necessary detachment of the disorganized parts just as well as poultices, without inducing suppuration in the surfaces which are undergoing adhesion. Indeed, it is possible for a reparation of the parts lost by the severity of contusion, to be produced under such a dressing without the occurrence of suppuration or granulation. The modeling process lately brought into notice by Professor McCartney, of Dublin, as we have before stated, is competent to repair extensive breaches in the soft parts, by an immediate organization of the effused fibrin. As fast as the disorganized tissues are detached under the water dressing, an exhalation of pure lymph is coagulated there, and receives an extension from the adjacent capillaries, which organize it into new flesh

or lining tissues, analogous to those with which it is continuous. This modeling process of reparation is, to be sure, nothing but an extension of Hunter's doctrine of the organizing power of recently effused coagulating lymph among the living parts, but still it has led to a great improvement in the treatment of large wounds, especially when attended with losses of substance.* Over and over again, cases have been witnessed by respectable members of our profession, in which large spaces have been filled up by this method of reparation, without the supervention of any appreciable degree of inflammation. Even the constant dripping of cold over the surfaces of such wounds, according to the plan of irrigation by McCartney, is not absolutely necessary to the institution of this process. By keeping the parts in perfect rest, and moistening the lint dressing frequently by means of a sponge, we can generally insure every advantage of the water dressing. If suppuration must

* The modeling process of reparation was compared, by McCartney, to the work of a sculptor in modeling his figures and busts of clay, portion after portion of coagulating lymph being laid on each other, in a wound, without waste. When the edges of a wound are kept apart for a number of days, and by means of the cold water dressing are prevented from inflaming, the gradual effusion of plastic fibrin in this way, will, finally, fill up the wound with an intermediate plug or wedge, which becomes thoroughly organized, and, finally, assimilated to the nearest parts. As this is exactly similar to the process by which the injuries of cold-blooded animals are repaired without inflammation, and by which their lost members grow out again, it is called, by some, healing by growth. I cannot see the reason for attempting to distinguish any of the forms of this method from each other, so as to entitle one of them to the denomination of *modeling*, and the other of healing by *growth*. The physiological explanation of all these forms of cure is altogether derived from Hunter, as every one will see; and the wet or water dressing was recommended by Hippocrates, and practised by Paré, Larrey, and numerous others, ever since the origin of the healing art. Indeed, the cold water dressing had been partially in use in this city from the time I began to practice surgery. I always directed my pupils, in the public and private classes, to delay closing all the large wounds resulting from operations, such as amputations of the breast, of the thighs and legs, for several hours, and to cover them with a layer of patent lint, kept constantly wet with cold water, until not only all oozing had ceased, but the glairy secretion of lymph had commenced over the surface. The value of this practice I learned from the late Dr. Parrish, or, rather, from Dr. Anderson, then of Halifax, who first taught him, and afterwards me the same thing—on the authority of a friend, who had learned it from Larrey in Egypt. The wet lint can easily be removed from the glazed surface of the whole wound, from six to twelve hours after the operation, and the edges be drawn together by strips, and maintained in apposition by compresses and bandages.

inevitably take place, we have only to substitute warm water for the cold, and maintain the temperature for a long time by means of a covering with oiled silk, to gain all the advantages that could be derived from a clumsy poultice.

Punctured Wounds.

In superficial wounds of this class which only pass more or less through the skin and do not penetrate the fasciæ, there is very little to be apprehended except in unhealthy constitutions. When they occur, however, in irritable temperaments, or in persons who have been previously exposed to morbid impressions, the most disastrous forms of nervous irritation and of diffuse cellular inflammation sometimes ensue. The whole profession is familiar with the details of Sir Astley Cooper's case of the young lady, who, on being pricked with a sewing needle, screamed and fainted and died. Cases of laborious seamstresses whose constitutions have been rendered exceedingly irritable from confinement or ill ventilated apartments, are not uncommon in which similar punctures produce very distressing, although not such overwhelming shocks to the nervous system. Fomentations with warm water, and the internal use of ammonia and opiates will in general relieve them, however, without the supervention of much local irritation. The diffuse inflammation of the cellular tissue which sometimes follows trifling punctures in intemperate habits, and in irritable and sanguine constitutions from other causes, becomes a much more serious disease in a surgical point of view. After a few hours interval from the occurrence of the wound, a smarting or tingling begins to be felt, which is speedily followed by a tumefaction of the neighboring parts, and afterwards by a rapid extension to remote parts. When such punctures take place in the dense and secretive structures of the hand, especially on the palm or surfaces of the thumb or fingers, the most intense form of nervous irritation is added to this diffusion of cellular inflammation. Sometimes the inflammation extends upwards more rapidly through the lymphatic or venous trunks, and then we see and feel streaks and knots upon their course above the portions of the integument which are puffed by the cellular inflammation. Finally, however, the whole limb becomes swollen, and the skin presents the erythematic and edematous puffiness which we have before designated as symptomatic or consensual erysipelas. Abscesses form in such cases, preventing infiltration in the common cellular substance throughout

extensive portions of the limb as in phlegmonous erysipelas, and sometimes confined in small spaces about the thecæ, and tendons, or ligaments. It is necessary to attend very carefully to the diagnosis and management of them to prevent the development of gangrene. But we have already explained this disease so fully under the heads of erysipelas and gangrene, that we may now dismiss the consideration of the general effects of small punctured wounds. The immediate effects of such punctures are supposed to be especially modified according to the organs or tissues which are penetrated by them. If a sensitive filament be punctured, it would naturally be expected to happen that the patient should be affected by sudden and distressing pain. In very irritable subjects, the pain may be excruciating and overwhelming, as happens so often among seamstresses and milliners. If the vessels, whether lymphatic or venous, have been injured, a traveling motion will of course be likely to be diffused through them by continuous sympathy. The common cellular texture is peculiarly disposed to irritation in this class of wounds, especially as when the puncture is made by a small pointed instrument, there will be no hemorrhage to infiltrate into the track of the wound. The penetrated cells will then be left open and exposed for a long time to the entrance of the air, and instead of an adhesive agglutination and obstruction of them from blood or lymph, an irritable and diffusive form of morbid inflammation will consequently be set up, and travel from cell to cell until it affects the whole limb. The promotion of hemorrhage into and from such wounds by tying ligatures above them, by bathing in warm water, by suction and rubbing, does not prevent injurious consequences by the evacuation of poisons, so often as it serves the purpose of blocking up the penetrated cells, and closing them effectually against the entrance of air. The use of a pointed stick of lunar caustic, now so generally resorted to by surgeons, also serves the purpose of closing the opened cells by coagulating the fluids which moisten them, and forms a defensive pellicle at the same time that it deadens the irritability of all the parts, and prevents inflammation. But the most important kind of punctured wound, whether small or large, is that which penetrates obliquely through the aponeurotic fascia, and tendinous thecæ of the tendons and ligaments.* The tension of all such parts resists the

* Perhaps bayonet wounds ought not to be mentioned here in connection with the above variety of punctured wounds. They are by no means so rare after our battles, as the recent European writers appear to imagine. During

inflammatory tumefaction, both from vascular enlargement and exhalation, to such an extent as not only to prove excessively irritating to the constitution, but often destructive to the vitality of the parts. We often see the tendons and phalanges of the fingers destroyed in this way after immense suffering on the part of the system. Under the head of gangrene we have pointed out how frequently disastrous consequences follow the neglect of inflammation, beneath the general fascia produced by punctured wounds. Indeed, nothing can be of greater importance in every case of bad puncture, than to prevent deep seated inflammation by rigid abstinence and rest, with evaporating lotions and appropriate defensive applications. In some very irritable constitutions, rigors and chills will immediately follow punctures, when warm fomentations and opiates will be the proper practice in addition to the dressings; but in the majority of cases, the cold water dressing will be the best application for the first few hours to prevent irritation. The old surgeons were generally in the habit of probing and dilating all such wounds to prevent subsequent infiltration and strangulation of the tissues. But now, we conclude, that except for the purpose of extracting foreign bodies, and evacuating large collections of blood from a punctured artery, and suppressing the hemorrhage, dilatation is not necessary. We wait until after the defeat of our precautionary treatment, and inflammation has arisen, and then when unfortunately we have been defeated in our first efforts, we make proper incisions to relieve the strangulation of all the fibrous tissues, and prevent the subsequent infiltration of matter.*

several of our revolutionary battles in the southern campaigns, terrible chargings with the bayonet were made and sustained by the Delaware and Jersey lines. At Chippewa and Lundy's Lane, also, the brave General Scott led his columns up to the awful clashings of the same weapon. Since the recent campaign in Mexico, I have already seen three severe wounds made by bayonets at Palo Alto and Resaca de la Palma. I can point out no practical course, however, for any such cases that is at all different from the observations of the text above, except to enforce an immediate attention to the means of checking hemorrhage from penetrated arteries. As the bayonet always makes a free wound when it traverses a large artery, we cannot depend upon pressure or styptics, but in general must dilate the wound and apply a ligature to the bleeding orifice.

* The same rules apply to gun-shot wounds of every description. If the bullet or other foreign body lodged in the track or at the bottom of the wound, be within reach or easily felt through the covering parts, it will generally be proper to extract it either by a dilation of the wound or by a new incision. But uncertain efforts should never be made in this way. If we are not sure of the

Warm water dressings, combined with nitrate of silver washes, and opiate solutions will speedily afterwards relieve all the dangerous symptoms, and in general overcome the inflammation without any loss of parts.

Gunshot Wounds.

If every missile which is sent into the body by the action of gunpowder is to be regarded as producing a gunshot wound, we shall have a considerable diversity to treat of in this chapter. Bullets, shot and slugs, ramrods, powder and wadding, buttons, clothing, splinters of wood, and every other substance which the explosion of a discharge, or the strike of a bullet, can break off and drive into the flesh, will all have to be arranged under the same category. Cannon balls, round shot, and shrapnels, with all the bodies which they scatter before them, will also come in for their share of harm doing. It is obvious, therefore, that the subject must

situation of the ball, it is vastly better to wait for inflammation and suppuration to occur around it, by which we can always be directed to the proper spot for making incisions, if they should become necessary. The process of adhesion, however, around a bullet may in a short time encyst it and defend the surrounding parts from injury by its presence. If it happen to be situated in a part not subject to friction or compression from the motions of a joint or muscle, it will remain then for the remainder of the patient's life without inconvenience. I have several old patients now in my recollection from whom I did not extract the balls after their lodgment in safe places, and they are all perfectly well. One, a young man on the Germantown road, has four slugs in the small of his back under the *multifidus spinæ*, which originally caused a total paraplegia of all the parts below from the discharge of a German Yeager, in the hands of an old soldier. Captain Scott, of the first regiment of volunteers now in Mexico, was shot with a single ball in the same way obliquely down the spine, during the Southwark riots. The ball had passed so deeply under the multifidus spine, as to be undiscoverable at the time. It produced a temporary paralysis from mere concussion. He got well, however, in the same manner as the former patient, under laxatives and counter-irritants, and the bullet never gives him trouble. I sent a young gentleman home from this city several years ago with a rapidly healing pistol bullet wound in the upper part of his thigh. The ball had entered just below the trochanter, and passing in front of the femur just underneath the anterior femoral vessels, nerves and muscles, lodged in the adductors near their origin. I did not deem it prudent to cut down for the purpose of searching for the ball, and the event proved I was right. In ten or twelve days he was nearly well, and went home to the city of New York. In the course of some weeks, however, attempts were made to find the bullet; bloody and unsuccessful incisions were repeatedly attempted, and finally the ball was spontaneously discharged by constant suppuration.

be a very extensive and complicated one, and that, after the usual way of discussing it, nothing more can be done than to arrange the different varieties under the heads of wounds, as we have already divided them. In general, they all partake of the characters, more or less combined, of lacerated and contused, and sometimes also of punctured wounds. In some rare instances they present the condition, at least in a portion of their track, of incised wounds. Thus, a smooth bullet, on entering the fleshy part of a limb with great velocity, and at some distance from the gun, will make a clean, slit-like passage through the member, which may heal by the simplest process of reparation, precisely like an incised wound. Sometimes the first part of its course through a limb will be like an incised or clean punctured wound, but the last part of its progress will make, from its diminished velocity, a lacerated or even contused wound.* Oblique passages of balls and most other missiles,

* The appearances of the orifices of gunshot wounds differ amazingly in different cases, according to the velocity of the ball, the obliquity of its direction, and the texture of the parts through which it passes. I have seen the orifice of entrance heal first in two cases; although it is most common for it to be contused and driven inwards or inverted, while the opposite orifice of exit is everted and torn so as more readily to heal under adhesive inflammation. The size and character of the two orifices of a bullet track, entirely through the body or a limb, become sometimes of great consequence in medical jurisprudence. A civil officer in Delaware was shot through the body when his assailants stood on opposite sides to his person. One of his assailants was condemned and executed, because the doctors testified that the bullet hole next to or towards him was the largest, and the opposite one, which they supposed to be the exit, the smallest. Now it is more than probable that the medical men were mistaken in their judgment in that case, and that the poor culprit was unjustly hung.

When the ball enters directly over a hard fascia or bone, which makes subcutaneous resistance, the hole is always cut clean out like that of an augur, and leaves sloughing edges, which suppurate for a long while. Mr. Whittaker, one of the young men shot down in the Kensington riots, two years ago, through the top of the femur, has not recovered yet. The bullet hole still discharges just below the great trochanter, and occasionally small spiculæ of bone discharge from the track of the ball through the cavity of the shaft of the femur. The bullet appeared to me to have passed entirely through the bone, and lodged in the adductor muscles just at their origin, where it has become encysted. A gentleman who was shot in the thigh last year, in a duel near this city, was under my care for a long time before I could heal the orifice of entrance. The ball was a large one, and struck the outer part of the thigh below the middle, just over the thickest portion of the fascia lata. The orifice was cut out of it by a punch, and the edges were much contused, so that, although it was quite

through the fasciæ and muscles, will often be attended with all the difficulties and results of bad punctured wounds. The idea that

small, it would not heal for five or six weeks. The ball had struck against the femur, and glanced around it, after becoming greatly flattened and ragged. I found it on the inner side of the bone, under the sartorius muscle, and although I had to make a large and deep incision there to extract it, and necessarily tore the muscle somewhat in detaching the roughened edges of lead, that orifice and the whole track healed in less than a week by adhesions. The whole limb, however, was torpid and numb for several weeks, from the violence of the local shock; and a greater portion of the skin became livid and green, from a general contusion of the capillaries.

In Mr. Cameron's case in Lancaster, when he was shot apparently through the body by a musket-ball, I was called out the same night to consult with my friend, Dr. Atlee. We found that the ball had traversed around the abdomen, across from the right to the left side, glancing under all the muscles, probably without laying open the peritoneum. The ball was extracted by Dr. Atlee just under the skin, where it had attempted to make an exit, and the whole track and last orifice healed without suppuration. The abdomen, however, became tumid and painful from the local shock or contusion, and required active depletion and purgatives for relief. The orifice of entrance was very small, and readily healed.

In the case of Mr. Galusha, the bank transportation agent, who fell under my care some years ago, for a pistol bullet wound, which traversed the whole breadth of his right buttock, there was no pain, or shock, or hemorrhage, or subsequent constitutional disturbance. These exemptions from the ordinary results of severe gunshot wounds, I attributed to the lax and yielding nature of the textures through which the ball passed. It did not strike any bone or hard fascia, but entered just behind the trochanter, and went out in the fissure of the buttock, behind and below. The result was, that the orifices, which both looked like small incised wounds, healed up readily by adhesions, but the track of the wound subsequently suppurated from too early exercise, and I had to evacuate an enormous abscess by a deep incision. There was no foreign substance diluted in the cavity, and the suppuration was therefore wholly the result of the patient's imprudence.

In the case of Mr. Griswold, the U. S. mail agent, who fell under my care for three bullet wounds, received in the night, at Bristol, in 1835, the muzzle was held within a yard of his face, and one ball entered the alæ of the nose, and passed through the nostril into the substance of the second cervical vertebra, whence it was afterwards dislodged; the second passed into the orbit of the eye, on the same side, through the lower lid, just escaping the bony edge of the orbit, and passed back into the sphenoid bone, where it still remains; and the third struck the front surface of the upper jaw bone just below the orbit, and passed back into the tuber maxillare, where it still remains imbedded. He fell, after one partial reaction, into a secondary stage of overwhelming shock, which persisted for some hours. He had no hemorrhage, except a little from his nose and throat, nor any pain or fever afterwards. The nerves of special

any poisoning influence can be induced by the passage of leaden pellets or bullets, stained by gunpowder or other foreign matters, had been entirely given up by military surgeons, until the present Mexican war broke out. Now it begins to be suspected that the copper balls and fragments of copper bombs of the Mexicans, can be so far rendered injurious by the effects of oxidation, as to poison the wounds of our unfortunate soldiers. The obsolete notion, however, that the combustion of gunpowder, and the heat of metallic missiles of any kind, can ever impart the peculiarities of burns to gunshot wounds, has not been revived.

The shock received from the sudden impulse of gunshot wounds is always more severe than from other kinds of injuries. In addition to the actual depression of the nervous system, and the consequent enfeeblement of the powers of the sanguiferous system, there is often a full share of mental disturbance after such injuries. The slightest wounds received just at the commencement of a battle, before the energies and passions of the soldiery have been roused by the noise and violence of conflict, are often attended with nausea, excessive trepidation and prostration, just like the state which occurs in timid and nervous patients at the commencement of a bloodletting. The latter state differs from full syncope from actual loss of blood, inasmuch as it is always speedily recovered from after a little agitation and exposure to fresh air. It is usually called syncope from mental disturbance, and is properly compared to that mental species of shock of which we have spoken, which does not follow the deleterious impression of a severe injury upon the principle of innervation, like the real nervous shock.* The disturbance

and common sensibility were entirely paralyzed on that side, and have never since recovered any power. But the muscular expressions are all perfect, and the scars of two of the wounds, the first two, are hardly visible. They healed like incised wounds; but the third orifice being contused against the body of the upper jaw bone, sloughed at its edges, and left a deep scar.

* The fairest instances of purely mental shock occur among our fashionable duellists, who go out to gain honor instead of the cure of a deadly feud. They practice for weeks beforehand, until they can hit a nail on the head in private, but when they come before an antagonist, they miss the whole space of a barn door. A case lately occurred in this country in which one gentleman fired twice into his mother earth, felt chilly, and had the jaundice for a month afterwards; and the other, after a whole life-practice at the pistol, fired also twice at his disarmed antagonist, and came nearer hitting the outside bystanders than his object. Whether he felt chilly or not, it was impossible to say, but he

from mental shock after slight injuries is soon recovered from, and in general, kind and soothing words of assurance on the part of the surgeon do more good in the way of answering this purpose, than any cordials or stimuli. But the real nervous shock endures much longer, and frequently requires invigorating means of treatment to restore the vital and animal excitement. It is generally supposed that we can judge of the extent and danger of the wound by the intensity and duration of the symptoms of the shock. Thus, if a bullet has glanced along the region of the abdomen, and we are uncertain whether it has penetrated that cavity and included viscera, or merely passed over them, between the muscles and the peritoneal lining, we examine carefully into the appearance of shock. If the symptoms be light and transient, we have reason to trust that it is only a superficial wound; whereas, in case the shock is profound and long continued, we indulge every fear of a dangerous visceral complication and death. It will not be proper, however, always to decide from this point alone; for in some persons very superficial passages of balls produce severe shocks, while in others the most dangerous and deep wounds of the viscera are followed by no considerable disturbance. It is always the combination of mental and nervous shock which creates most alarm, although it is from the latter alone that all the real danger proceeds.* A combination of

turned pale and livid, and has hardly recovered a fair complexion since. How different such cases from that of the gallant Duncan, who, on receiving the glance of an Indian rifle bullet on his skull, in one of the swamps of Florida, speedily recovered from a severe concussion of the brain, and taking off his cap, and searching in vain for the bullet, exclaimed, in a satisfied tone, "I expected as much." I have seen one really brave duellist shot through one of his thighs, after which he showed no tremor, while he insisted upon being suffered to go on, and was unwillingly dragged from the combat. One of our great statesmen, on being wounded in a similar manner, begged to be propped up against a tree, until he could give his antagonist every satisfaction. But such absence of mental shock is as rare in duels as they have been among love-sick maidens under the operation of blood-letting.

* Perhaps we ought to allow that very severe mental shock, in timorous subjects, may sometimes destroy life, as in the case of the wild rabbit of this country. They often fall down, and are caught without being hit by the shot of the sportsman; and it is said that they sometimes die outright from mere terror, after an explosion of a musket. The experiments of some of the savans during the French Revolution are here worth alluding to, during which those condemned to execution, supposing they were to die blindfold from blood-letting, expired from fright at the sound of water falling into a basin, after a mere prick at the bend of their arms.

the effects of severe hemorrhage with those of shock, presents the most hopeless condition after gunshot wounds. The cases of insidious shock which are characterized by the slightest impairment of the animal functions, while the energies of life are essentially crippled, are not so frequently witnessed as in civil practice after compound dislocations, and other such terrible injuries.* Still they

* The first case of insidious shock, however, which I ever saw, occurred after a severe gunshot wound in the lower part of the popliteal region, in a brother of the eloquent Judge Conrad of this city, in the year 1821. He was an interesting youth of seventeen, with a delicate temperament, and almost transparent complexion. He had received an accidental discharge from the fowling-piece of a fellow sportsman standing close behind him, and the whole charge of shot, wadding, and burnt powder, had penetrated deeply into the origins of the gastrocnemius and solci muscles, destroying the skin and fasciæ as large as the palm over the ham. I saw him with my brother, Dr. Samuel McClellan, who was then a student in my office, within two hours after the accident. He had been troubled with no pain or severe hemorrhage. His pulse was regular, his respiration full and calm, and everything apparently tranquil. But I observed the peculiar expression of suspicion and anxiety about his eyes and forehead, while his mouth and lower part of the face were smiling—exactly as I have described under the head of insidious shock. On watching the case carefully, I was satisfied that tubercles existed in the apices of both lungs, and that his vital forces were shattered, although he exhibited no derangement of the animal functions. He complained of nothing, not even of uneasiness. In reply to every inquiry about his condition, I answered that he appeared altogether too well for such a case of injury, and that I dreaded everything from the delicacy of his temperament and peculiar symptoms. On the second day, he began to exhibit tremors, sighing, and hurried respiration; on the conclusion of that day, infantile delirium, and a very rapid pulse, and before inflammation or gangrene actually set in, he fell into slight rigors and convulsions, and died on the third day. A post-mortem examination revealed numerous miliary tubercles on the liver, as well as in the lungs. Another case of a boy twelve years old, at the Lamb Tavern, on the road to the Schuylkill Falls, occurred about twenty years ago, under the care of the late Dr. Taylor. I was called in consultation at 10 o'clock, P. M., about five hours after the injury, and found the little patient perfectly comfortable, and only desirous of being let alone. Dr. Taylor had at first bound up the ham with lint and compresses, moistened with alcohol and laudanum, and two other medical gentlemen of character had seen it in the meantime, and pronounced it a perfectly safe case, because there had been no hemorrhage and no suffering. On examining it, however, I found the popliteal artery and nerve, and inner head of the gastrocnemius entirely destroyed by the burnt powder, and shot, and wadding, and the foot and toes pulseless and insensible. His pulse was wholly unaffected, and so was his respiration. His countenance appeared cheerful, but on a close observation I convinced Dr. Taylor and the relatives of the boy that his expression was altogether unnatural. He looked suspicious, indeed (as they said)

must occasionally have occurred, although from inattention, or an ignorance of their character, they have not generally been noticed by military surgeons.

Notwithstanding the importance of shocks, hemorrhage is the most serious of all the complications of gunshot wounds. More lives are lost from it, either directly or indirectly, than from all the other circumstances combined. The usual practice, on the field, is to check it immediately by the application of a tourniquet, or some extemporaneous substitute, which answers a temporary purpose, to the expense of a most injurious congestion of the wound and all the parts below. When, after a long delay, and, perhaps, transportation of the sufferer to a distant rendezvous, the strangulating ligature is removed and the bleeding orifice sought for, the most embarrassing difficulties have to be encountered by the operator, from engorgement and coagulation of blood among the injured parts. Even provided the wounded artery then be found and successfully tied, the most unfavorable condition of things will be presented for the restoration of a sound circulation and reparatory efforts among the injured parts. In hot weather, especially, vascular engorgement, tumultuous excitement, and mortification, are insured by such a rude and mechanical treatment. The surgeon would, in general, do vastly better by leaving the wound in the hands of nature, under such circumstances, and endeavor to assist the propitious syncope by maintaining the head and shoulders, for a while, in an elevated position, and applying cold fomentations to favor contractions of the vessels and coagulation of the blood, than injure the vitality and organization of all the textures in the wounded limb.* There can be no doubt of the superiority of the French

angry about his eyes, and smiling with a melancholy sadness about his lips and chin. In fact, he looked as Montezuma is described to have done, when in captivity he received Cortez back again into his capital. I decided, from my repeated experience in several preceding cases of a similar character, that the boy would die. But I agreed to go back and hold a consultation the next morning, to decide about the propriety of amputation. I received a note at breakfast, however, that I need not go. The two physicians who had seen the boy after Dr. Taylor had come into town for me, had been there again at sunrise, and pronounced that the patient was getting on well, and would not require any additional treatment. At dinner time I got word again that tremors and spasms had occurred, and that the boy was dying. I could not go there, however, and in the evening I heard he was dead.

* Whenever the tourniquet is intended to be used for any length of time, for

practice on the field of battle, as instituted by Larrey, to take up the wounded arteries at once by a prompt operation, if the severity of the hemorrhage appears to require it. In moderate cases, or where it is impossible to perform the operation, local compression by graduated compresses, or* pieces of compressed sponge, over the bleeding orifice, held on by the hands of an assistant, or by a bandage applied so as not to confine the venous circulation, will answer an equally useful temporary purpose, without involving the dangers of complete strangulation. Under almost any emergency, a flat piece of wood or shingle, or a strip of tin or sheet-iron, can be extended across the compresses and bound down by a bandage or the tourniquet, so as not to obstruct the neighboring veins from a return of the venous circulation to the body above.† When, after

the purpose of suppressing a hemorrhage, the surgeon should previously apply a bandage firmly and equally around the whole limb below, from the tips of the toes or fingers upwards, so as to prevent, as far as possible, venous strangulation. Nothing can be more slovenly or unscientific than the application of a tourniquet, except for the temporary purpose of amputation, without this preliminary dressing with a bandage. Indeed, it has been occasionally employed in amputation to prevent previous engorgement and loss of venous blood during the operation. In all cases where tight bandages have to be bound around the wounded part, it will probably be best to cover the whole limb below in the same manner, by an evenly tight application of the roller. By keeping the limb elevated, and the bandages moistened afterwards with cool water, it will be easy to prevent vascular engorgement, while we are suppressing the hemorrhage by severe local pressure.

* Small pieces of dry and compressed sponge are altogether better than large ones. They can be packed upon each other more effectually into the cavity of the wound, so as more certainly to reach the artery, and when it is necessary to remove the dressings, they can be detached more readily and with far less disturbance to the inflamed surfaces. Dr. Mott has published some just observations upon this subject, in the New York Journal. If dry lint with styptic powders be used for the graduated compresses over a bleeding orifice, it should be divided into fragments in the same way. A subsequent removal, piece by piece, can be much more easily effected than in mass. A very convenient method of maintaining steady pressure over such compresses, is to apply one of the pads of a Hull's truss over them, while the spring is passed around the body or limb, and the opposite pad presses upon the opposite side. This will accommodate all the motions of the body, and maintain an unremitting pressure under all circumstances.

† I have repeatedly placed a long piece of paste-board, from a book-cover, over the compresses on bleeding arteries, and bound a bandage upon it so as to make adequate compression without obstructing the principal veins. Once I broke off a piece of old rusty iron hoop, and made it answer the same pur-

a few hours delay, under this treatment, we seize convenient opportunity to decide upon the necessity of more permanent measures, we often find that the wounded artery has either contracted or the blood over and within it has coagulated sufficiently to prevent all danger of a return of the hemorrhage. The same thing often happens after a moderately protracted syncope, and provided we keep the patient at rest, and maintain the vascular actions at a low stage of excitement, by cooling drinks and the antiphlogistic regimen, we shall occasionally, at least, find that the permanent means of arresting hemorrhage by adhesion have been instituted.* Of late, the old practice of compressing the main trunk alone above the wounded artery, has been revived in the same manner as it has been applied in Dublin and elsewhere, for the cure of large aneurisms. By an apparatus, which is merely a complication or modification of the old loop of iron and thumb-screw, powerful pressure is made on the

pose perfectly. By placing a thin compress under each end of the paste-board or hoop, we can prevent them from irritating the skin, while the large compress is bound down firmly upon the artery by the bandage, and leaves the neighboring sound vessels uncompressed. This, at least, will answer as a temporary substitute for the iron hoop and thumb-screw, which we use for the compression of small traumatic aneurisms. I believe this method was first suggested and put in practice by my lamented preceptor, the late Dr. Dorsey, of this city.

* Nothing can be more reprehensible than to disturb the dressings of a wound in which a hemorrhage has been arrested. As long as the parts are dry and quiet, let them alone until the subsequent discharges begin to loosen the dressings. By that time the processes of adhesion will have permanently closed the orifice in the wounded artery, and prevented all secondary hemorrhage. During the riots in Southwark, I dressed a horrid cannon-shot wound in the right groin of a young soldier from Germantown. He had been struck there with a broken piece of cast iron, with the fragments of which one of the cannon in the hands of the mob had been loaded. The whole fore part of the fleshy substance of the groin, in contact with Poupart's ligament, had been torn away, and a prodigious rent made across the artery, with a hole in the vein. He had flooded the floor, on which he lay, with gore, and was deadly faint when I arrived. It was late at night, and the rioters were all around. I, therefore, applied graduated compresses, and bound them down with a spica bandage. But it required two hours constant nursing, with his head and shoulders in my lap below the bedside, and the incessant use of cordials and brandy, to revive him. During his reaction the poor fellow was delirious, and wanted to go home. He had no return of hemorrhage, however, and by morning I got him so far recovered, as to have him transported, in a carriage, to one of the hospitals. There, however, somebody stripped off his bandage and pulled away the compresses, to see how I had dressed the wound! The blood gushed out in a torrent, and a second fainting process carried the patient off to a better world.

main trunk on either of the limbs, without confining the venous circulation in any part, except in the immediate neighborhood of the artery. This will, in most cases, moderate the impulse of the circulation at the wound below, so effectually as to promote a full coagulation and contraction at the orifice, at the same time that it allows of the institution of the adhesion processes for permanent obliteration of the injury. We often succeed in this way by making only a temporary pressure with the thumb, or a hard compress, over the main artery above the wound, just as we sometimes depend upon the same measure, to the exclusion of the tourniquet, in the performance of an amputation.*

It must not be supposed that any of the previously described

* I have repeatedly checked hemorrhages from the throat, jaws, and face, by pressing firmly, with one of my thumbs, upon the common carotid of the neck on the same side. In one case, where the internal carotid had given way just within the vaginal process of the temporal bone, after an extirpation of the parotid gland, I succeeded three times, in company with my friend, Dr. Morton, in arresting a tremendous hemorrhage by this pressure. After continuing the compression for about half an hour each time, coagulation took place in the wound, and the hemorrhage was checked, at one period, for three entire days, and, on the other two occasions, for several hours, before high excitement brought on its repetition by forcing off the coagula. About two years ago, I repeatedly arrested a hemorrhage, in the same way, from an anastomosing tumor of the orbit and temple, for the relief of which my son afterwards took up the common carotid. It is now quite a common occurrence to arrest a hemorrhage from the hand or arm, by temporary pressure over the subclavian artery above the clavicle, and, of the foot and leg, by resorting to the same measure over the femoral artery at the groin. If the wounded artery happens to be completely divided instead of being punctured, sufficient retraction, and contraction, and coagulation may take place, after this kind of pressure, to effect a permanent suppression of the hemorrhage. It is only where an incomplete division of the coats of a wounded artery prevents retraction, that the hemorrhage is likely to return at every rise of vascular excitement. On this account, some surgeons have recommended to search for the orifice and effect a complete division of the artery there, instead of tying it up with a ligature. In the small arteries, as the temporal and palmar branches, this plan, indeed, does often succeed. But no judicious surgeon would depend upon it in the larger trunks, especially as it is always easy to ligate them when they are brought into view for the purpose of division. In the above mentioned case of hemorrhage from the internal carotid, after repeatedly suppressing the hemorrhage by pressure below, as well as directly upon the orifice, by means of graduated compresses, confined on the part by a Hull's truss, I was obliged, after all, to cut down at midnight and take up the main trunk with a blunt hook and ligature. This operation succeeded, and saved the life of the gentleman.

measures can of themselves effect a permanent closure of the tube or orifice of a wounded artery. They only produce a temporary check of the hemorrhage during which the processes of inflammatory exudation of lymph and consequent adhesion of the coats of the vessel can be established. These latter conditions are very properly considered as the true or only permanent means of arresting hemorrhage. But at least three or four days are usually occupied in the institution and completion of such processes, during which period it is always possible for a return of the hemorrhage to be effected by the violent reactions or excitement of the vascular system throwing off the coagula and forcing open the contracted orifices of the wounded artery. This is called by all writers a secondary hemorrhage, but as there is still an ulterior form of bleeding in some classes of wounds, it is best to qualify this by the epithet, first form of secondary hemorrhage, or secondary hemorrhage from reaction. Whenever the artery is not completely or transversely divided, but only cut into or punctured by a wound, this form of hemorrhage is very common. Sometimes repeated temporary arrests can be effected in such cases by coagulation and contraction after fainting, or an equivalent diminution of the momentum of the circulation from pressure, and still at every subsequent recovery of vascular power and excitement, the bleeding will be reproduced.* This repetition of the first form of secondary hemorrage finally tends to produce great constitutional weakness or irritability, attended with loss of the due proportion of red globules (*anemia*), giddiness, throbbing in the heart, palpitations of the heart, bounding or rapid and

* I have repeatedly seen these returns of hemorrhage produced from leaving the coagulum permanently in the wound, which acts like a hot sponge, and constantly promotes a tendency to hemorrhage under reaction. The coagula should always in such cases be thoroughly cleaned out by the fingers and a sponge or scoop, and the contact of fresh air alone will then often stop the hemorrhage. At all events we can then find out the situation of the bleeding orifice, and decide whether to close it by a well directed graduated compress or a ligature. Sometimes we find in bleedings after the previous application of a ligature, that a careless surgeon has applied the thread across an oblique orifice of a cut artery instead of behind it, and the blood continues to rush out behind the noose. In such cases we have to seize the artery and pull it further out from its sheath, and apply another ligature higher up and fully above the oblique orifice. Graduated compresses, also often do harm when they are improperly applied, so as not to press exactly upon the bleeding orifice. It will be vastly better to leave the wound open so as to expose the artery to the constringing influence of the air, than to stuff the cavity carelessly.

thrilling pulse, hurried respiration, &c.; and if not checked will soon afterwards eventuate in the most alarming prostration. In some cases this condition is never recovered from, and continues to afflict the sufferer for years afterwards during the continuance of life. Such patients will remain pale and chilly, and weak or excitable under all circumstances and in all climates. Sometimes they become bloated and dropsical, or leucophlegmatic in their appearance. They are very properly characterized by the term anemic, which is well calculated to designate their deficiency of calorific and vivifying or red particles of blood. But such cases present only the chronic forms of derangement from losses of blood, and are to be treated at leisure by tonics, chalybeates and improved diet. They are mentioned here chiefly for the purpose of cautioning practitioners against temporizing modes of practice in bleeding wounds. The acute symptoms immediately following repeated hemorrhages, are of more pressing moment, and should be carefully regarded in every case. They have been most admirably described by Mr. Marshall Hall in his publications upon the subject, and should be held in the memory of every surgeon. They are characterized by most writers as high or inordinate excitement without strength, and have been already anticipated in the earlier pages of this work under the head of constitutional or general irritation. No surgeon should ever allow himself to mistake the cerebral and nervous disturbance which occurs in such cases for the effects of inflammation, nor the thrilling and excited pulse, hurried and anxious respiration and flushed state of the face and skin for symptomatic fever. The bounding and jerking or thrilling pulse so often occurs after large and repeated losses of blood from wounds, that it is almost considered as characteristic of hemorrhage, and has therefore been called the hemorrhagic pulse. If it becomes feeble and soft, or imperceptible, it is almost certain that the further loss of blood can be prevented by moderate measures. The irritated and excited pulse from excessive depletion, is especially different from an inflammatory one, inasmuch as it does not tend to the increased development of fibrin, and therefore does not favor the processes of reparation and permanent closure of the wounded artery. Every moment's delay in arresting the hemorrhage, contributes to the prevention of a final cure, and of course increases the hazard of the patient. No delay should be allowed even for the purpose of tranquilizing the symptoms, but immediate recourse should always be had to the most prompt and

efficient means of a permanent closure of the artery. At the same time, however, cordials and stimuli, and anodynes may be employed to prevent the general irritation from wearing out the energies of life, and subverting the necessary processes of adhesion.

After the occurrence of a secondary hemorrhage, especially if it has been once or twice repeated, there is so much infiltration or injection of blood into and among the neighboring textures, that the search for a bleeding orifice through the wound becomes very difficult. Free dilatations have always to be made upwards and downwards along the course of the artery distributed to the region of the wound, and the wounded branch has generally to be tied above and below the orifice. This is especially the case in wounds about the hands and feet, on account of the free anastomoses of the supplying arteries of these extremities. To avoid encountering these difficulties, many surgeons now resort to an incision higher up the limb along some part of the artery above the wound, where there can be no danger of encountering infiltrated blood, which may conceal the relative situation of the parts. To avoid the dangers of a return of hemorrhage from anastomosis of the terminal branches as in case of the palmar and plantar regions, they even sometimes secure the main artery in the upper portion of the entire limb. This method has some strong advocates, but it can only be proper in desperate cases where all simpler efforts have failed in consequence of extraordinary or very free anastomoses.*

In many cases of secondary hemorrhage we can succeed perfectly well without resorting to any cutting operation. If we get an assistant to make firm compression upon the main trunk of the artery above, while we are clearing out the coagula and searching for the bleeding orifice, we can apply well graduated compresses loaded

* One case has occurred within my knowledge in which a medical friend first took up the radial artery unsuccessfully, for the suppression of a palmar hemorrhage, and afterwards cut down upon the main trunk of the brachial high up towards the axilla. The hemorrhage then ceased permanently, but the arm was lost by mortification. I have never yet seen a case in which I could not check the hemorrhage under such circumstances, either by securing the artery itself by a ligature, or by compression contained in the ways I have recommended. In most cases I enlarge the wound in the palm, or plantar region, and search for the orifice. It has only happened in two cases that I have been obliged to take up the radial above the wrist, and in four or five at the utmost that I have secured the tibials for such wounds during my whole professional life.

with styptics upon it in such a firm manner, as to ensure a subsequent obliteration of its cavity. A powder composed of equal parts of powdered galls, tannin, and gum-arabic,* applied by means of moistened compresses of lint or sponge, and bound down firmly with a well adjusted roller, while the pressure is still maintained on the trunk above by an assistant, will often succeed to our full satisfaction. The reason why graduated compresses and styptics do not oftener succeed in the hands of practitioners is, that they attempt to make such local applications, while the blood is still flowing from the orifice. To make them perfectly effectual they should keep up the compression over the main trunk above for half an hour at least after the styptic has made its full impression upon the wounded orifice. By that time the coagulation and contraction will have become so fully perfected as to resist the returning impetus of the circulation.

The other kind, or stage of secondary hemorrhage, of which we have spoken, results from a sloughing of the coats of an artery from injury or contusion. It occurs at an ulterior period after the occurrence of the original wound: usually not until an interval of between ten and fifteen, or twenty days. The track of shot or a bullet, or any other foreign material across the course of an artery,

* A great variety of other styptics have been used by surgeons for the purpose of suppressing hemorrhage. Pieces of agaric-like dry and compressed sponges favor coagulation, and answer the purpose of graduated compresses at the same time. Alcoholic and watery solutions of the metallic salts, or vegetable astringents favor contraction of the vessels, while they at the same time favor coagulation and the effusion of lymph. The application of pure creasote and turpentine are still more efficacious in the same way. But care should always be taken to suppress the circulation by pressure on the main artery, while we are applying any of these styptics. Lunar caustic acts very much like pure creasote, in immediately coagulating a pellicle over the whole surface of the wound, including the vessel. The more potential caustics as well as the actual cautery prove efficient by actually disorganizing the coats of the artery and shriveling them up. They are hardly ever used, however, by modern surgeons, and when they are employed, should be introduced through glass tubes down to the bleeding orifice to protect the other parts from injury. I have in this way introduced red hot wires of the largest size down the throat and up the nostrils to check the hemorrhage from bleeding vascular tumors with perfect safety. In one case, after other styptics had failed, I introduced spirits of turpentine upon a piece of sponge in this way, and after firm pressure for a few minutes the bleeding stopped. I have tried the aqua-binelli and the Brochieri water without any advantage. Also the preparations of ergot and the tar water. They are no better than simple cold water in the human subject.

may cause so much injury to the vitality of its coats, as to insure a subsequent sloughing of them.* By the time, however, that the

* Whenever the course of a ball or gunshot charge has penetrated the soft parts across or along the course of an artery of any size, I always suspect a secondary hemorrhage, although there may be no bleeding at first. We can always judge of this by carefully probing with a large buttoned probe or director; or by ascertaining the position in which the patient stood, and the quarter from whence the charge was directed towards him at the time of the infliction of the wound. Such a contusion of the coats of an artery, moreover, as is likely to eventuate in sloughing, will generally produce a decided feebleness and diminution of the pulse throughout all its ramifications below the injured part. I have always suspected the danger of this kind of secondary hemorrhage from the main arteries, whenever the pulse in an injured limb does not rise to the same vigor and action, after full reaction, as on the opposite side. But, of course, a contusion on a small spot or portion of an artery, may not always diminish the force of the circulation before sloughing; and in very severe contusions, the area of the vessel may be closed before sloughing has time to occur. We must not put too much confidence in any symptom, therefore, but provide for the contingency in all suspicious cases.

Three years ago last Christmas week, I was called out into the country, by Dr. Smith, of Chestnut Hill, to consult with him and two other physicians in the case of young Mr. Culp, the plasterer, near Norristown. He was a temperate and healthy young man, twenty-one years old. On leaning upon his double-barreled fowling-piece, loaded with pheasant shot, with the muzzles in his right arm-pit, he accidentally caught one of his boot straps in one of the hammers and fired off the percussion cap and shot charge. He was immediately seized with spasms or general and convulsive movements, and sprang about to the right and left without any apparent consciousness. He vaulted over a high fence and back again, then over another fence, and ran across the highway towards his father's house, where he fell into complete syncope at the door step. An enormous hemorrhage had been, in the mean time, discharged into his clothing and over the ground near where he stood, and along which he had passed, but the discharge had entirely ceased under fainting. When the neighboring physicians got there, they found an enormous burnt wound in the centre of the axilla, with blackened and burnt edges passing up along the course of the vessels towards the coracoid process. The powder, wadding, and shot, had all been driven into the wound, and they hoped, therefore, that the contusion of the surfaces, in addition to the coagulation, would enable them to prevent a return of the hemorrhage by the pressure of compresses and bandages. About thirty hours afterwards, however, a severe hemorrhage returned from the wound in consequence of vascular reaction forcing off the coagula from the torn vessels. He fainted again almost unto death, and remained several hours exceedingly prostrate, during which period I was first called in consultation. As large tents well graduated in the form of compresses had been forced into the wound with styptics, to the total suppression of the hemorrhage, I judged it best to wait for a return of the discharge before securing the main artery. The case progressed very well after that for ten entire days, when, on turning over in his bed

ulceration has commenced, it may have happened that an internal effusion of coagulating lymph has obliterated the tube of the vessel. It is only in cases where a defect in the process of adhesion occurs, that a secondary hemorrhage results from sloughing. The same accident may follow the ulceration under a ligature in unhealthy subjects, or when the application of the ligature has been improperly made. As we shall state, under the operation for aneurisms, if severe mechanical injury be perpetrated during the performance of the operation, or if the ligature be applied upon an unsound or extensively detached portion of an artery, this form of secondary hemorrhage will be almost sure to result.

The first thing to be done in such cases, is to make pressure upon the main trunk of the affected artery somewhere above the injury, and then to apply graduated compresses and styptics to the bleeding orifice, as before recommended in the other form of secondary hemorrhage. In all cases where these measures fail, an incision must be made upon the course of the artery, above the injected and inflamed parts, and a new ligature applied, as in cases of operation for common aneurisms. Great care should, moreover, be taken to promote healthy excitement of the system and injured parts, for the purpose of insuring the reparatory stages of adhesive inflammation.

In some rare cases, it will happen that after the external orifice of an obliquely penetrating or even gunshot wound has been fairly healed, or, at least, after its track has been so fully closed as to prevent all external effusion of blood, the sloughing or yielding of the coats of the injured portion may give way, and produce an internal collection of blood in the form of a false or traumatic aneurism. This will sometimes be circumscribed by surrounding adhesions and condensation of the cellular tissue, in the form of a true aneurism, but more commonly it will be diffused extensively along

at night, a tremendous hemorrhage broke out again and flooded the whole of his bed-clothes. He fainted again, and they were able to suppress the bleeding until I arrived with my son, Dr. John H. B. McClellan. As the bleeding reappeared whenever we attempted to loosen the compresses, I immediately cut down at the clavicle, and my son secured the subclavian there just above the upper verge of the inflammatory swelling and engorgement. The sloughs of dead cellular texture, and shot, and wadding, afterwards came away through the original or gunshot wound in the axilla, along with the suppuration, and the patient got well with a good use of his arm.

the course of the vessels.* In all cases it will have to be treated as an aneurism from other causes, although it follows as an immediate consequence of the wound. If well directed pressure over the main trunk above, or over the wounded portion of the artery, does not speedily succeed in checking all pulsation and diminishing the tumefaction, an incision must be made above and the sound artery secured by a ligature. It will then very rarely be proper to lay open the cavity of the collection of blood, for the purpose of securing the orifice in the artery.

* About twenty-five years ago, an apprentice boy of Mr. Hoffman, the cabinet maker in Race street, received an oblique penetrating wound from a narrow chisel, on the fore part of his left arm, which ran upward along the course of the ulnar artery. A very slight flow of blood followed, and under the pressure of a linen compress and silk handkerchief bandage, the external orifice healed in a few days without suppuration. He shortly afterwards, however, applied to me with a pulsating tumor about three inches below the inner condyle, which was attended with a severe shooting pain up and down the course of the ulnar nerve, and occasionally with convulsions of an epileptic kind, when sudden blows or pressure was inflicted upon it. As he could not bear any kind of pressure from compresses or pads, I cut down upon the tumor and dissected around it. I found it was a fine condensation of the cellular texture around a rent in the ulnar artery, through the substance of which the nerve was transmitted. The artery was tied above and below, and the tumor carefully dissected away from the ulnar nerve, and no symptoms of inconvenience followed the recovery.

Some years ago, Mr. Russell, Esq., of York Co., Virginia, brought his son, about twenty years old, to me with three bullet wounds in the lower part of his left axilla, which he received in a conflict at the University at Charlottesville. An unsuccessful attempt had been made at Norfolk to secure the subclavian over the first rib, but from a severe hemorrhage, probably from a cut in the transversalis colli artery, the operator was defeated, and the case sent to me. I found the track of the three balls or slugs had been oblique and partially closed, so as to restrain external hemorrhage. But the axillary artery had given away from sloughing of a contused portion in the middle of the axillary cavity, and a large diffused collection of pulsating blood formed, for about five inches in extent, along the course of the artery. As no compression could be successfully made, and the patient was already anemic, and hourly in danger from hemorrhage through the unhealed bullet wounds, I made an incision into the upper region of the axilla, turned up the lower border of the pectoralis major, and detached the main artery from the midst of the axillary plexus. My excellent friend, Dr. Bacon, my son, and several other gentlemen, assisted me, and I had the pleasure of seeing the pulsation immediately disappear, and the patient afterwards recover. But the arm continued stiff and shriveled until he went home, and I had the unhappiness to hear afterwards that the unfortunate young gentleman was threatened with phthisis.

Venous hemorrhage from wounds can always be distinguished by the dark Modena color of the blood, and the dullness and steadiness of the stream. It almost always ceases spontaneously on closing the lips of the wound, and making very slight external pressure. Whenever the flow of venous blood continues obstinate, either from an amputated stump or a large wound of any part, we may be very sure there is some undue pressure acting upon the venous trunks above or nearer the heart. On completely slackening a tourniquet above, or after removing all the bandages and tight clothing, the trouble generally ceases at once.* At all events it is improper to resort to the application of ligatures, except in very rare cases. The texture of veins is very different from that of the arteries. While the internal coat of an artery is very fragile, and yields to almost any pressure of the ligature so as to assist in closing the cavity and in accelerating the subsequent adhesions, the corresponding texture of a vein is tough and unyielding. It becomes pinched or bruised under the ligature, and sloughs instead of adhering under the processes of inflammation. Diffused or erysipelatous inflammation is very apt to pass up along a vein towards the heart, and fatal results occasionally occur from this cause. It is always best, therefore, to avoid a ligature upon a wounded vein, and to depend upon compresses either directly or externally applied.† The danger from admission of air into the venous circula-

* In the case of Miss Oliver, in Wood street, after I had dressed an enormous wound for the removal of a very large tumor, involving one of the breasts, I was called back to suppress a frightful venous hemorrhage. On opening the dressings I found that the long strips of adhesive plaster had acted as ligatures across several large varicose cutaneous veins, above and in front of the wound. The moment the strips were removed the hemorrhage ceased. But she was well nigh exhausted unto death, and it required cordials and stimuli to reinvigorate her. By depending on compresses and broad bandages to keep the lips of the wound in apposition, the veins gave no more trouble.

† About three years ago, I extirpated a large fibrous tumor from the groin of a gentleman, near Fredericktown, in Maryland. It was wedged into the external crural ring and canal for the passage of the femoral vessels, and on dissecting it away from the coats of the great femoral vein, I found the saphena interna involved in the substance of the tumor, just as it emptied into the great trunk. I was obliged to divide it there, and afterwards failed to restrain a tremendous gush of black blood by pressure. I, therefore, pursed up the orifice by a spring tenaculum and Liston's forceps, and got my assistant, Dr. Peter L. Thompson, now of the Cherokee Nation, to cast a fine silk thread around the margin. This succeeded perfectly in restraining the hemorrhage, and was fol-

tion from wounds, is not so common as some authors have supposed. It generally occurs during surgical operations about the neck, and throat, and axillary regions, as we shall subsequently explain, from the lifting or dragging of the partially incised trunks during dissections or extractions of tumors. No prudent surgeon, however, ever disturbs the relative situation of an injured vein of considerable size, during his management of a wound, from a dread of this circumstance.*

The wounds of veins heal in general very differently from those of arteries. While the tubes of the latter are almost invariably obliterated in the human subject even after punctured wounds, the coats of a vein can easily be repaired without at all diminishing their cavity. We all know how rarely the canal of a vein is obliterated by the operation of venesection; and the same disposition to maintain the permeability of their course is witnessed after most wounds. This fact affords another objection to the application of a ligature to them, although we have had so many reasons for recommending that operation for the wounds of arteries.

In connection with hemorrhage something ought to be said concerning the occurrence of syncope. Fainting from sudden loss of blood is so common that perhaps some may think it almost a work of supererogation to say more than we have already done in relation to its advantages in the way of reducing violent inflammations and of suppressing hemorrhage. But there are some points in relation to it which are not generally noticed by authors. The ordinary syncope, which is attended with a complete prostration of all the

lowed by no inconvenience. This was the largest venous orifice I ever saw tied with a ligature. It must have been large enough for the insertion of one of my ring fingers. When I have been forced to secure the internal jugulars, they have never been found more than half as large.

* To enable a deep inspiration to draw the air into an orifice in a vein, it is necessary that the vein should be kept fully dilated, or patulous, or *canalized*, as it is called by late writers. The textures of some parts, as in the liver, keeps the veins constantly canalized even when empty. Previous thickening or induration of the coats from chronic disease, may maintain the veins in a patulous or distended state during an operation, so may distention from the extended position of a limb or part. When the operator pulls at a vein at the same instant he cuts into it, he will easily allow air to be drawn in, and so will any considerable disturbance of its position at the same period. To prevent the effects of deep inspiration in promoting this venous insufflation of air, many operators have, of late, been in the habit of tight bandaging around the chest, so as to confine the efforts of respiration to the diaphragm.

animal functions, and a temporary impairment of most of the vital ones, is well understood by most of the public and the profession. This, however, is often confounded with the mental shock, of which we have already spoken. When it actually occurs, it always proceeds from a direct subduction of the stimulus of the circulation from the brain and nervous system, and also perhaps in some degree from a diminution of distention in the ventricles of the heart. This condition always impairs the force of the whole circulation so completely as to favor coagulation in the track of a wound, and a temporary suppression at least of all hemorrhage. It resembles very closely the state of depression from overwhelming shocks, and severe concussions of the brain. By lowering the position of the head and shoulders, and thus favoring the access of blood to the brain under the influence of gravity, by dashing cold water over the surface and by the use of stimulating sternutatories we always hope to succeed in rousing the actions of the heart and producing subsequent general reaction.*

But there is another and much more alarming condition which occasionally results from the same cause, and is not so generally understood by the public. Convulsions, often of a universal and terrific character, also arise from sudden losses of blood. Defect of stimulation in the brain is as likely to produce convulsions as over-excitement of the organ. Some persons are peculiarly liable to this derangement, and often patients warn us against the danger of blood-letting from this source. The disease is called by some *convulsio syncopalis;* and by many is compared to epilepsy. Sometimes the pulse continues to be deficient throughout the progress of these convulsive struggles; at others it returns long before their disappearance. In general it does not prove a dangerous affection, but yields to the same treatment which is used for ordinary syncope.

* The application of galvanism has not, to my knowledge, been tried in this city for the cure of syncope. In desperate cases, however, I shall certainly feel bound to resort to it for the direct purpose of stimulating the heart into action. The current may be passed through the cardiac region by placing one pole at the nape or along down the upper portion of the spine, and the other over the epigastrium. Perhaps the plan recently tried in France, of introducing it more deeply through the nerves by means of acupuncturing needles fastened to the opposite poles, will prove still more efficacious. The use of stimulating injections of brandy or turpentine into the rectum has been found advantageous in some desperate cases of protracted syncope, exactly as I have recommended them in cases of overwhelming shocks.

Greater care, however, should be taken to keep the head depressed, and to prevent the injurious effects of subsequent reaction by the long-continued application of cold water to the head. The only fatal cases which we have known to occur, have been improperly treated by further depletion, or by the foolish anxiety of friends to make the patient appear more comfortable by maintaining the body in an erect or sitting position. The occurrence of similar convulsions from a deficiency of cerebral energy is by no means uncommon in the practice of medicine. How often do we see pale and delicate children, after exhaustion from diarrhœas, or the long-continued want of nutrition from worms and other intestinal irritations, fall into convulsions, for the relief of which depletion proves fatal! Many enfeebled and anemic adults and elderly persons also perish from improper detractions of blood after the convulsions and paralyses into which they decline from a mere want of vascular distention. All practitioners of medicine, as well as surgery, should be made aware of the fact that nervous irritation, unless carefully attended to, may easily be mistaken for the symptoms of inflammation in the brain or spinal cord.

The usual mode of drawing blood in a recumbent posture for the purpose of preventing fainting or convulsions is liable to one strong objection. If so much is taken away as to produce either of those affections in that posture, no subsequent change of position can afford any degree of relief, and the danger of a fatal termination is therefore greatly increased; whereas the symptoms of prostration from loss of blood occurring in an erect posture can always be diminished, if not at once overcome, by lowering the patient's head and body to a horizontal position. Almost all surgeons, therefore, when they determine to push a venesection *ad deliquium animi*, perform the operation in an erect or sitting posture. On the same account we generally prefer the sitting position during the extraction of tumors and other severe operations which endanger free losses of blood. The patient in the first place will faint before he loses blood to a dangerous extent, and in the next he will react very readily upon being laid down upon a pillow or a cushion. There are some cases, however, in which it is proper to draw blood in the horizontal posture. If only a small quantity is required to be drawn for the mere purpose of mitigating plethora or vascular excitement, unaccompanied with inflammation; or if we have been forewarned that there is an idiosyncrasy in any individual which renders him

invariably disposed to fainting or convulsions, we may have good reason to prefer the recumbent posture. Care, however, should always be taken in such instances to avoid pushing the remedy to the full extent of a deliquium. There is another practical matter in relation to this subject, which no surgeon should ever forget. The danger of a recurrence of the bleeding from a defective application of the bandage is always augmented by a neglect of the condition of the clothing around the limb above. A tight sleeve of an under jacket or a retracted shirt-sleeve* will often produce an exhausting hemorrhage in bed some hours after a previous blood-letting. In all cases where a free orifice has been made in a large vein, it is always best, after attending to the above precaution, to apply a narrow strip of adhesive plaster over a small linen compress and across the vein before surrounding the limb with a bandage. The figure-of-eight bandage, for so the alternate turn of the roller above and below the elbow is called, should moreover be applied in such a manner as to insure a greater tightening of the lower than the upper circle.† Everything, in short, which is calculated to make pressure above the orifice in a vein so as to impede the progressive circulation, should be scrupulously avoided. The practice in this city of leaving all such matters in the hands of the bleeder and leecher cannot be too severely reprehended. At least the physician should give such practical directions to the manipulator as will serve to prevent the necessity of ringing up the town over night for the aid of a surgeon.

There is another kind of accidental hemorrhage of which we ought to make mention here, because it sometimes terminates in the most dangerous prostration. Leech-bites in the delicate skins

* The late Dr. Neill and I were called in one night to see a young man who had lost a deluge of blood in his bed from a recurrence of bleeding six hours after a venesection, and on examination we found that the difficulty had proceeded from a tightly retracted sleeve of a cotton-wove inner jacket, which had not been drawn over the bandage along with the sleeve of the shirt. A small sleeve of itself alone, even when not retracted, will tend to produce this kind of hemorrhage by the pressure which it exerts on the veins of the upper arm.

† It is an excellent rule to apply the bandage in the same state of flexion of the arm in which the joint is afterwards to be kept. If the position of the arm is much changed after the dressing, it is very apt to derange the action of the bandage and make it press above the orifice. This will especially be the case if the turns have been carried across the prominence of the elbow instead of alternately crossing above and below it.

of irritable temperaments and of infants, especially where foreign leeches have been used, are very liable to be followed by protracted hemorrhage. The common plan is to burn them thoroughly with a pointed stick of lunar caustic or a red-hot wire. The glazed surface of a piece of visiting card pressed firmly upon the orifice will, however, in general answer perfectly well, and possesses the advantage of leaving no deforming scar. In the worst cases which have occurred, and in which the small cutaneous arteries had been perforated, the insertion of a small cambric needle across the orifice, and a few subsequent turns or twists of a waxed thread around it, has at once overcome the difficulty. Bleeding from fissures in the lips, which sometimes lay open the coronary arteries, may be relieved in the same way; also hemorrhages from orifices in the skin over broken varicose veins of the legs, and almost every other superficial discharge from slight wounds, no matter how they may have been produced.*

Cases of constitutional liability to hemorrhage are so common in this country, that some practical directions ought to be given here for their management. They are said to be the result of a peculiar hemorrhagic diathesis which prevails to a remarkable extent in certain families. Hereditary influence and blood relationship are both manifested in an extraordinary manner in connection with this disease. Grand-parents, parents, and children have all in suc-

* I have repeatedly cured salivary fistulas in this way, by inserting the small needle across the outer orifice before it had become fistulous. After slitting open the urethra for the extraction of large pieces of gravel or calculi, I have succeeded in the same way, taking advantage at the same time of the use of a catheter for the first two days after the injury. As I have alluded to bleeding from cracks on the lips, I will describe an interesting case. In the year 1822, the bar-keeper at the Mansion House Hotel, then kept by Mr. Bailey, had a deep crack in the middle of his lower lip from the effects, as he thought, of a frost-bite. On attempting to laugh one evening at the joke of a bystander, he broke open the fissure so deeply as to lay open the coronary artery, from which two fine streams spurted out, crossing their fire, in opposite directions. After all sorts of styptics and pressure had been tried in vain, I was called in after midnight. I seized a small pin out of his coat sleeve and thrusting it across the fissure so as to transfix the orifice in the artery, I twisted a waxed thread around the pin, and checked the hemorrhage at once. Although I was ridiculed for using the horse-doctor's plan of tying up the jugular in his familiar operation, still I had the satisfaction of performing a prompt cure. When I removed the pin, after a delay of two days, I seared the parts well with lunar caustic, and every vestige of the frost-bite soon disappeared.

cession been affected with it; and whole circles of brothers and sisters sometimes exhibit the same tendency. It has been asserted, though not with exact propriety, that the males are peculiarly liable to it. Females do certainly sometimes present its worst manifestations. Its most common form appears after the extraction of a tooth.* Any slight puncture, or scratch, or wound of the skin or

* It may be questioned whether the previous irritability and inflammation in the socket, may not have softened and disorganized the coats of the nutritious artery of the tooth, before the time of its extraction, so as to cause the protracted hemorrhage in many cases, independently of all constitutional tendency. We occasionally meet with cases of very troublesome and dangerous returning hemorrhage after previous unhealthy inflammation in the parts, which soften down the coats of the vessels, so as to render them incapable of bearing a ligature. I will describe the following two cases in illustration of this point.

1. Mr. Slack, the prothonotary of the court at Mount Holly, in New Jersey, was seized several winters ago with the epidemic influenza, which terminated as many others did that season, in a critical abscess of one of the submaxillary glands. The gland at first became enlarged and very tender under pressure, and finally, after a severe and protracted inflammation, a periadenic abscess formed over and around the gland, which on being lanced, discharged an ichorous sanies. In a day afterwards, a violent hemorrhage broke out, and continued in spite of all pressure and cooling applications around until complete syncope. As often as he reacted from day to day, the hemorrhage would return, and produce a renewed fainting. After several repetitions of this process, an alarming prostration supervened, and I was sent for in consultation with Drs. Tucker and Stratton. As the hemorrhage was plainly proceeding from some artery, opening into the cavity of the abscess, I dilated the orifice through the purple and undermined integument and fascia of the throat and jaw; and on sponging out the soft coagula, I found the facial artery had been ulcerated into, just as it passed over the base of the jaw bone, and its loose end hung down and pulsated into the cavity of the abscess. I held it between a thumb and finger, while Dr. Tucker applied the ligature; but it proved to be so soft and rotten, that the thread cut through it instantly. I repeated the same attempt twice nearer the origin of the artery, the last time even after dissecting it out a little from above the submaxillary gland, and underneath the jaw, and the same result followed. The cellular sheath appeared to have been dissolved or softened down by the morbid inflammation and unhealthy suppuration which had produced the abscess. As the hemorrhage was greatly increased by these attempts, I seized a spike of iron from the kitchen wall, and after heating it red-hot in the stove, I applied its point to the bleeding orifice. The hemorrhage then ceased permanently; and on applying creasote washes and ordering tonics and improved diet, we shortly had the pleasure of hearing of his perfect recovery.

2. The second case I will mention under this head, occurred in the person of Mr. Ashman, of Ohio, after a great deal of previous inflammation and disturbance about the throat, in consequence of severe operations for securing the ex-

mucous membrane may, however, be followed by a troublesome and almost irrepressible hemorrhage in such constitutions. The best topical means of suppressing the bleeding is to apply firm and steady pressure with dry styptics and compressed pieces of sponge or cork. The compound powder of tannin and gum-arabic, or nut-galls dusted into the cavity of the alveolar processes or wound of any part after a firm compression of the supplying arteries, and bound down by the sponge or agaric for a long time will prove the most efficacious plan. Fluid styptics, and caustics and cauteries, are all exceedingly apt to fail. The actual cautery especially is likely to exasperate the difficulty and prevent the possibility of enduring the subsequent application of local pressure.

As the idiosyncrasy which constitutes the hemorrhagic diathesis is always connected with great constitutional delicacy of organization both in the solids and fluids, proper attention should be paid to the general treatment. To allay the accompanying vascular excitement, the external application of cold water, and the internal use of nauseating doses of antimonials are the best remedies. If the hemorrhage continues after their full influence, a combination of the acetate of lead and opium and ipecacuanha, will serve to contract

ternal carotid, and afterwards the internal, in connection with an extirpation of a scirrhous parotid gland. After the wounds in the throat had nearly cicatrized, and the gentleman had recovered strength enough to go out, the lower angle of the old wound broke open afresh, and discharged a violent hemorrhage. This repeatedly occurred, and finally made a large cavity beside the larynx and trachea. On laying it fully open I discovered full an inch of the superior thyroid exposed at the bottom of the wound, with a rent or fissure in it from which the blood was welling out. On attempting to secure it by a ligature, the thread cut through it at every trial exactly as in the before mentioned case. I then took a pointed stick of pure lunar caustic, and seared the two ends thoroughly, and afterwards pressed a dossil of lint with pure creasote upon them. This commanded the hemorrhage effectually, and the patient recovered by a return of healthy suppuration and granulation under the use of tonics.

The different cases related in the recent foreign journals of arteries, and even veins, ulcerating or opening themselves into the cavities of neighboring abscesses, must be classed in the same category. A previous morbid or irritable inflammation, having softened down their coats by a species of ramollissement, led the way to subsequent hemorrhage under reaction. Instead of being the results of a hemorrhagic diathesis or constitutional predisposition, they are plainly derivable from morbid inflammation which has preceded them. I have known of several cases of death from hemorrhage, from the abscesses and irritable sinuous ulcers in the throat, which result from malignant scarlatina in children, all of which undoubtedly must have occurred in the same way.

the vessels and favor the coagulation of the blood. Large doses of alum, or the sulphate of zinc may also be used with advantage in some cases. But under all circumstances exposure to fresh and cold air, and perfect rest are absolutely necessary to a successful treatment. But the judicious practitioner will not content himself with relieving the critical attacks of this disease. Whenever he discovers the constitutional tendency in any person or family, he will direct appropriate diet, tonics, and regular exercise in the open air to improve the condition of the system and fortify it against such dangerous attacks.

Tetanus.

As tetanus is the most formidable consequence of all wounds which do not prove more immediately fatal from the severity of shock, and as it is especially likely to follow punctured and gun-shot injuries, this will prove the most appropriate place for its consideration. Although it occasionally occurs as a simple or idiopathic disease in consequence of morbid impressions upon the constitution, still by far the most frequent as well as dangerous form of tetanus follows as a symptom during the progress of wounds. It is therefore called symptomatic or traumatic tetanus by many of the authors who have written most carefully concerning its pathology. The spasmodic character which is usually attributed to it should not, however, mislead the inexperienced practitioner to mistake for it the ordinary cramps and convulsive movements of the muscles after injuries and accidents. The essential character of tetanic spasms is very properly said to be tonic, and attended with a permanent rigidity of the affected muscles, instead of a short and sudden or clonic spasm, followed by a long or shorter interval of complete relaxation. Although the voluntary muscular fibres in this state of disease are always more tense and unyielding than natural, still this rigidity varies considerably in different cases, being sometimes so moderate as to allow of some exercise of voluntary power during the remissions, while in other instances it is so incessant and severe, as to confine the affected parts like a solid bone or bar of iron. The exacerbations or paroxysms also differ very much in their severity and frequency of repetition. Sometimes they occur every few minutes with great regularity, while at others long intervals of various periods are witnessed: in some cases, again, although the majority present a far milder form of paroxysm the violence of the spasm is

terrific, and it is accompanied with insupportable pain and agony—amounting to a universal convulsion—every repetition of which is more dreaded by the unhappy patient than immediate death. The extent to which the disease extends throughout the muscular system, also differs in the various cases as they occur in our practice. Although the bowels are often obstinately costive, and the mechanical function of respiration is frequently very much impeded, the involuntary and the non-striated muscles are generally thought to be unaffected by tetanic spasms. The voluntary muscles of mastication and deglutition are often, in the first stage at least, exclusively affected, and then the disease is called *trismus* or simple locked-jaw. When the posterior muscles of the trunk and extremities are chiefly involved, the case is called *opisthotonos*; and the term *emprosthotonos** is applied to the anterior distortions of the trunk, resulting from the spasms of the corresponding voluntary muscles. The spasms of one side of the body exclusively, are denominated *pleurothotonos*, or lateral tetanus, while those of the whole voluntary system are characterized as the universal or general tetanus.

Some authors have with great propriety divided this disease into two other forms, as regards its severity and danger, acute and chronic. The first makes very rapid progress, is excessively painful, especially at the paroxysms, and extends in a very short time throughout the whole muscular system. This almost invariably proves fatal, and may be compared to hydrophobia in danger, which indeed it resembles in many other respects. The chronic forms of tetanus extend very slowly, and are sometimes even confined to the muscles of the jaw, or back of the neck, throughout the whole progress of the disease. The paroxysms are never so severe or distressing as in the acute tetanus, and the disease is altogether more amenable to treatment. Almost all the cases of cure which have ever been reported, even in the boastful and ill-digested periodicals,

* Emprosthotonos is of such rare occurrence in this country, and in Europe, as to be hardly ever described by authors; some, indeed, having denied its existence. Baron Larrey, however, saw it often in Egypt, and attributed it to the influence of wounds received on the fore part of the body. If opisthotonos is conversely the result of wounds on the back part of the body, it ought to be still more unfrequent, because, with the exception of the soles of the feet and toes, injuries are much more frequently received in front than behind. Sir Gilbert Blane, however, saw two cases, in which the same side of the body which had been wounded, became affected with lateral tetanus, or pleurothotonos.

have been chronic. Acute tetanus generally proves fatal in about three days from its commencement. Cases, however, sometimes occur in which death takes place in a few hours, and one case of a negro in the West Indies has been recorded when death followed in fifteen minutes from the attack. Chronic tetanus often lasts for fifteen or twenty days, and if the symptoms are not getting exasperated by that period, we may hope to restore the patient. Mr. S. Cooper records a case, however, which died in five weeks after the attack, but the patient finally became exhausted by extensive suppuration around a denuded and amputated stump. Tetanus supervenes much more speedily after an injury than hydrophobia. The latest day after a wound on which Larrey ever saw an attack of tetanus, was the fifteenth; and the British army surgeons in the Peninsular wars, never saw a patient affected by it who escaped for twenty-two entire days. It occurs, moreover, before cicatrization of the wound, and even in most instances before suppuration. Indeed the full development of the suppurative process is generally thought to be a protection against the occurrence of tetanus. Certainly in all cases which are complicated with tetanus after the stage of suppuration, the secretion of pus becomes arrested, and the surface assumes a sanious or a dry and torpid appearance. Perhaps, however, an exception should be taken against the establishment of a general principle in relation to this point, in consequence of the occurrence of such painful spasms, as sometimes amount almost to tetanus, from the ganglia-like enlargements and thickening of the nerves which are involved in the cicatrices of stumps and lacerated wounds.

Tetanus differs more especially from hydrophobia in there never being a complete relaxation or intermission between the paroxysms, as always happens in the latter disease; also, in there being no such accompanying gloom, horror, or derangement of mind, as occurs in hydrophobia. The functions of the brain are not affected, except in the latter stage or decline of tetanus, when congestion of that important organ may occur in the same manner as at the close of any other fatal disease. The whole spinal cord appears to be the true seat of the irritation in tetanus, while its upper portion alone, along with the brain, becomes the central points of irritation in hydrophobia. The difficulty of deglutition often appears as great in this disease as in the rabies; but there is never such aversion to the presence of liquids, and the paroxysms are not so decidedly brought

on by attempts at taking them down the throat. There is also much less secretion of salivary fluid about the mouth and fauces, and an inferior degree of respiratory embarrassment. The jaws are movable in the rabies, and frequently in motion for the purpose of clearing the throat of the excessive secretion of saliva, whereas they are fixed and immovable in tetanus. The most characteristic difference between the two diseases, however, consists in the fact, that the paroxysms of one are brought on by stimuli operating through the organs of special sense (like the optic, the auditory, and gustatory nerves), and, of course, through the medium of the brain; while in the other, or tetanus, the convulsions and rigidity are excited by stimuli operating on the reflex principle through the medium of the spinal cord. The most important difference, in a pathological point of view, relates to the origin and mode of propagation of the two diseases. While true hydrophobia is always conveyed into the system after an indefinite period of incubation, by means of vascular absorption, the excitement of tetanus is solely propagated through the injured nerves, which at first take on the irritation themselves, but afterwards convey it and locate it upon the spinal cord. The irritability of that great nervous centre, or, rather, series of independent centres, then appears to become thoroughly perverted, so that almost every kind of impression can stimulate the reflex function into a morbid excitement of the muscular system. Post-mortem examinations sometimes show an unnatural engorgement, or even an inflammation in this central, as well as in the periphral point of nervous disturbance; but, in the same manner as in most other nervous diseases, the consentaneous existence of vascular derangement is by no means necessary to functional embarrassments.

The first symptoms of tetanus which are usually detected, are a difficulty of deglutition and rigidity of the jaws, which are speedily followed by a stiffness in the back of the neck, and a spasmodic distortion from rigidity of the muscles of the countenance. Shortly afterwards a sense of stricture or confinement at the epigastrium, which is probably owing to a spasmodic contraction of the triangulares or sterno-costales muscles, arises; and when this is connected with irregular and very difficult respirations, the disease has extended to the neighboring portions of the diaphragm. If these symptoms supervene rapidly, and soon afterwards extend throughout the muscular system, we may pronounce it a case of acute

tetanus, and indulge but a very little hope of a cure. On the contrary, if they follow each other slowly, and only after distinct intervals, and the limbs continue for some two or three days unaffected, we may anticipate a more favorable result, and calculate upon the supervention of a chronic tetanus.

As in all other forms of intractable disease, the treatment of tetanus has been very diverse and even opposite in its characters, under the hands of different practitioners. Few have ever agreed either upon the local or general management. While some employ stimulating and even caustic applications to the wound, for the purpose of exciting inflammation and suppuration, in all cases where, from the influence of climate or constitutional idiosyncrasy, tetanus is anticipated, others prefer altogether the use of cooling and sedative applications, to prevent, as far as possible, the supervention of all inflammation. The general treatment, again, is conducted, by some, wholly on the antiphlogistic plan, and tremendous blood-lettings and purgings, followed by emetics and antimonials, or other relaxants or sedatives, are depended upon throughout the whole course of the disease. The opposite class of practitioners depend on opium in enormous quantities, with brandy, camphor, or hyoscyamus and its congeners, with a great variety of adjuvants, while they deprecate everything in the form of depletion. There can be no doubt that the variation in the character of the different cases must give origin, in some measure, to a corresponding difference of practice; but we can hardly admit that either one or other of these rival practices is exclusively correct. Judicious observers all know that there is no essential point of pathology in any one disease, which shall control all the other circumstances and conditions so as to compel us to resort to any especial and restrictive mode of treatment. This is particularly true in tetanus, where the spinal irritability, although wholly marked and permanent, is connected with a great variety of pathological conditions in other parts of the constitution, as well as in its direct associate, the nervous system. In some cases the heart and arteries are at first greatly excited, and as long as such a condition is allowed to exist, the secretions and exhalations will all remain obstinately locked, in spite of our efforts with medicaments. Direct depletion is unquestionably proper under such circumstances, as a preliminary or contemporaneous measure for other influences, but the system often falls into an asthenic condition, and an opposite course will, in

general, have to be afterwards pursued. Sometimes local depletion by leeches around the throat, and cups down the spine, can be more safely employed. In the majority of all the cases, however, which occur in this country, the system is in an atonic state at the beginning of the disease, and stimuli with opiates have to be resorted to in the commencement. The condition of the primæ viæ almost always becomes deranged, and the best pathologists have thought that a neglect of that circumstance after the reception of wounds, gives origin to most cases of tetanus. If no degree of tetanic rigidity in the muscular coat of the intestines can be supposed to exist, certainly the secretions always become defective and morbid, and great torpidity prevails there. The most active and stimulating cathartics are always required to act on the bowels under such circumstances, and as it is difficult for the patient to swallow bulky mixtures or masses, full doses of croton oil with calomel should be frequently repeated, until they produce the desired effect. It is often necessary to aid even these with repeated enemas of turpentine with castor oil, and to repeat the same efforts, from day to day, throughout the whole progress of the disease. It is astonishing to witness the quantities of black and offensive discharges which such remedies will throw off, for several days in succession, in severe cases of tetanus.

As the condition of the skin is often cold and torpid, stimulating embrocations and frictions are generally resorted to as remedies. But in general the most efficient means of overcoming this unfortunate complication is, by the use of the vapor or spirit bath, aided by opiates and cordials. Dry heat, communicated by hot air, conveyed under the bed clothes by tin tubes from an air furnace, has sometimes been found exceedingly useful in this respect. The warm bath has always proved too temporary and exhausting in its effects upon tetanic patients, and the cold and shower baths have repeatedly proved accelerating to the fatal termination.*

The condition of the urinary organs requires particular attention, because the want of discharges does not invariably proceed from a spasmodic contraction of the sphincter and urethral muscles, as has

* During the period of my pupilage, I superintended for the late Dr. Joseph Klapp, of Southwark, the application of a cold shower bath in a case of traumatic tetanus in a boy. He was laid on a rug upon the floor, and a couple of buckets full of cold water were dashed over him. He immediately fell into a series of terrible paroxysms, and died in less than an hour.

been supposed. In the worst cases there is sometimes a complete suppression of urine, which, as in most other cases of intense irritation, becomes almost necessarily a fatal symptom. Dry cupping, followed by severe counter-irritants over the lumbar region, and fomentations with woolen cloths wrung out of hot decoctions of narcotic plants around the pelvis and loins, or the universal vapor bath, sometimes succeed in relieving this the most dangerous of all the symptoms. Large doses of calomel, with camphor and nitre, and mucilaginous injections, will aid very much in promoting this secretion in the same manner as after severe shocks from injuries. If the bladder happens to become over distended from mere spasmodic retention, the same external measures should be aided by opiate or tobacco enemata, to relax the spasms of the urethra before attempting the introduction of a catheter.

The great constitutional measures, however, to be relied on in the majority of cases, are to tranquilize the system by large and frequently repeated doses of opium, and the maintaining of the regular action of the bowels by a combination of calomel and croton oil, or some other active cathartic of an eccoprotic character. Hydragogue cathartics are always improper, because they deplete the circulation too severely, and prostrate the vital powers. The frequent repetition of the calomel, along with the opium and other remedies, not only assists in maintaining the secretions, but tends, fortunately, in some cases, to produce a critical salivation. In all hot climates, mercurials are found to be especially serviceable, and many judicious practitioners employ it freely by external inunctions at the same time that they are using it internally. It is astonishing to witness the quantities of active medicines which patients afflicted with severe tetanus require, to produce any positive effects. The system always acquires a remarkable tolerance of remedies in this disease. From half an ounce to an ounce and a half of solid opium is said to have been given in a day for this disease, without producing any narcotic effect. In the same the strongest injections of tobacco* are required, in order to overcome the muscular spasms, and then they hardly ever prostrate the system. The influence of

* I once attended a severe case of traumatic tetanus, in consultation with Dr. Goldsmith, of Kensington, to whom large quantities of a strong decoction of tobacco were administered by injection. The spasms and rigidity were entirely overcome for several hours, without any dangerous degree of prostration, but the disease recurred the succeeding night, and proved fatal.

such remedies appears to be altogether expended in overcoming the irritation of the disease.

From the prevalence of the doctrine of spinal pathology in relation to tetanus, great reliance was at one time placed on severe counter-irritation along the whole length of the vertebral column. Powerful caustics, and even actual cauteries, were formerly applied over large surfaces at the same time.* But now the general practice is to apply cups in the early stage, while vascular excitement prevails; and afterwards to follow them by long blisters down the spine, dressed with morphium ointment, or some other endermic anodyne.

Before it was supposed that the proximate cause of the disease was a fixed central irritation in the spinal cord, great attention was paid to the condition of the wound itself, in order to counteract or lessen the local disorder of the affected nerves at the first point of injury. Incisions were made across the course of the supplying nerve, immediately above the wound, and even amputations were sometimes performed with a view of cutting off all communication between the supposed *punctum saliens*, and the *sensorium commune*. But after the disease had become fairly established in the constitution, such efforts always proved unavailing. It can only be in the threatening stage, and before the existence of any fixed disturbance of the spinal cord, that local treatment shall prove of much benefit. In general, it is unquestionably best to prevent the occurrence of local irritation in all wounds, especially in hot weather, by cooling lotions and mild dressings, and not to resort to counter-irritants of any kind, for the purpose of producing inflam-

* Many years ago I assisted the late Dr. Eberle in the management of two cases of tetanus. One of them proceeded from a compound fracture of the tibia, and, after blood-letting and antimonials, followed in vain by large doses of opium, the use of the actual cautery down the spine appeared for a while to promise complete relief. He had no paroxysm for several hours in succession, but finally fell into convulsions and died. The other case occurred in an intemperate man, from large irritable ulcers on his legs. The actual cautery appeared, for six entire days, to have relieved him altogether, but he fell into an apoplexy, and died of coma. I applied it down the whole length of the cervical and dorsal region on each side of the spinous processes with a red-hot nail rod, drawn rapidly along, so as to excite full vesication, and followed the applications by a dressing of basilicon ointment. Of late years, I have been better satisfied with the influence of cupping, either with or without scarification, down the whole spinal column, followed by the ordinary counter-irritants and endermic remedies.

mation. The practice of soaking all punctured wounds with warm lye poultices and hot turpentine, was taken from the veterinary art, and proves most unsuitable for the human subject. The favorite application of lunar caustic can hardly be considered as an irritating one, and it frequently proves protective against inflammation and nervous irritation, by creating a defensive pellicle over the orifice, and occluding the exposed cells of the *tela cellulosa* from the entrance of air, or, as John Hunter used to say, from the stimulus of imperfection. There can be no doubt that an occasional repetition of the ancient practice of dilating punctured wounds, or of making deep incisions transversely across them, may sometimes prove a good prophylactic, by dividing punctured or otherwise injured nerves, and thus cutting off all communication with the great spinal centre. In general, however, the moderate application of nitrate of silver, directly over the wound, and the constant use of cool water dressings in all plethoric habits, or of emollient and narcotic poultices in irritable ones, will comprehend the proper local treatment in the great majority of cases of tetanus.*

* I have attended a very large number of cases of tetanus, from first to last, and in consultation with different practitioners of great experience and reputation; but I am sorry to say I have witnessed but very little success in the traumatic species. Mild cases of idiopathic tetanus have generally got well under the influence of vapor baths, mercurials and antimonials, with opium; but the acute and symptomatic forms have almost uniformly died under every mode of treatment. I published, in the last edition of Dr. Eberle's work on the Practice of Medicine, the only two cases of acute traumatic tetanus I ever saw recover. In both of them, I gave from 80 to 90 grs. of solid opium in conjunction with about half the quantity of calomel, *per diem*, for several days in succession. In the case of young Mr. Bockius, of Germantown, whom I attended in consultation with Dr. Runckel, Sr., we first cut away the comminuted fragments of two metacarpal bones of the left hand, which had been shattered by the bursting of a gun, and dressed the wound with terebinthinates. We kept up irritation over the whole spine by frictions with croton oil and tartar emetic, and gave 82 to 86 grs. of opium a day, for about two weeks, without producing any coma or oppression. The remedy appeared to expend all its powers in allaying the universal tetanic rigidity and spasms. We also rubbed mercurial ointment over the limbs, and gave calomel in combination with the opium, until a moderate ptyalism was produced. The bowels were kept open by occasional doses of croton oil, and the strength was maintained by the liberal use of brandy with gruels. In a few days the wound began to suppurate, and the rigidity and spasms disappeared. The patient has continued well for about fourteen years

The other case of cure to which I have alluded, was that of a house carpenter, Mr. McGlathery, in North Fifth street, who was seized with a universal

In the infantile tetanus, *trismus nascentium* of the South, it has been recently suggested that a change of the decubitus will prove the great measure of relief as well as of prevention. Dr. Sims, of Alabama, has published an interesting communication in regard to his experience with this variety of the disease, especially among the young negroes on the cotton plantations of his vicinity. He ascertained that too long exposure of the yielding portions of the occipital and parietal bones to the influence of pressure in the horizontal posture, caused the attack by inducing cerebral and spinal engorgement. The division of the umbilical cord appeared to have no connection with the origin of the spasms. Most of the females, mothers and nurses, are absent from their huts hours together, in the cotton field, while the infants are left motionless upon their backs, until the very bones are pushed in upon the cerebral masses underneath. A frequent change of position, and especially an avoidance of the supine posture, has been found a certain prophylactic against the disease.

rigidity and painful spasms on the ninth day after a deep puncture in the sole of one of his feet from a rusty nail. The wound was perfectly dry, and more than an inch deep, when I laid it open, and stimulated it with lunar caustic. It was then dressed with spirits of turpentine and basilicon. As he was cold and shivering, I continued the use of a hot vapor bath which a steam doctor had begun to apply, for many hours, and gave 3 grs. of opium and 5 of calomel every hour, till an impression was made on the spasms. No narcotic impression was induced, although I increased the doses to nearly 100 grs. a day, occasionally. On an average, he took full 60 grs. of opium *per diem*, for twelve days, and the calomel was aided by mercurial frictions, until ptyalism was induced. The spine was at the same time irritated by blisters and tartar emetic ointment. He was supported throughout by the liberal use of brandy and gruel, with broths, and finally recovered perfectly. There was a serious difficulty encountered in every step of his case, from apprehension, because a young man, one of his apprentices, had died in his house the summer before of lock-jaw, from the same kind of accident, under the skillful management of Drs. Thomas and Hartshorne.

I have never seen any benefit result from attempts at curing by amputation, even of the small members of the extremities, except in the case of Mr. Bockius, above detailed. I recollect making the attempt for Dr. Stansbury on the person of a tobacconist, in New Market street, many years ago. The patient had contused the index finger of his left hand very badly, and torn open the middle joint, in a piece of machinery, and a complete tetanus had set in upon the fifth day. I amputated at the knuckle joint, but a terrific paroxysm supervened just as I was dressing the stump, and the poor man died in less than five minutes.

Poisoned Wounds.

Poisons operate upon the system in various ways. The mineral poisons affect chiefly the lining membrane of the stomach and intestines, by irritation or corrosion, in consequence either of a direct application, or of transmission through the medium of the circulation. The narcotic poisons are supposed to influence the system chiefly through the medium of the nerves, although they may certainly be absorbed and propagate their impressions directly upon the brain. Animal poisons, being introduced into the circulation almost exclusively through the infliction of wounds, alone become a subject of this department of surgery. These differ from each other in their character and effects, according to the species of the insect or reptile in which they naturally exist, or according to the disease of the animal in which they are generated.

The stings of venomous insects, although sufficiently troublesome, are, in general, by no means dangerous. Cooling lotions of salt water, vinegar, lead water, or diluted alcohol, will, in most cases, speedily allay the irritation, and protect the constitution from any severe disturbance. But a large number of stings from any of these tribes, inflicted at the same instant, will often produce serious consequences. An attack of enraged bees, or wasps, or hornets, has frequently proved fatal in animals as well as men ; and, in some rare instances, the simple bite of a musketoe or spider has been followed by extensive ravages of the system.* The external and internal administration of ammonia as a counter stimulant, and the repeated dashings of cold water over the whole surface, or the continued use of evaporating lotions, have been especially useful in such distressing cases. Where the local irritation at the very point

* I have met with several very extensive and irritable ulcers on the face and arms, which resulted from musketoe bites. Once I treated a very large irritable sore on the ankle, in a delicate female, from the same cause. It is generally necessary to destroy the whole surface by caustic potass, or pure nitric acid, before we convert such into healthy ulcers. About three years ago I was called into consultation, with Drs. Goddard and Horner, in the case of a lady whose left leg had ulcerated and sloughed extensively, from the bite of a spider, and upon whom amputation of the thigh had eventually to be performed. The sloughing in that case appeared to have resulted from a diffused inflammation of the cellular tissue, among and below the muscles of the leg below the knee. The bite of the spider had taken place some weeks before I saw the case, on the outer side of the ankle.

stung or bitten has been great, incisions with the point of a lancet, followed by extraction of the lost portion of the insect, or destruction of the part by the action of a caustic, have often proved successful in our practice.

The bites of serpents and other venomous reptiles, however, become the especial objects of surgical treatment. As some few minutes always intervene between the occurrence of the wound and the subsequent absorption of the virus into the circulation, there is always a chance of preventing mischief by the immediate application of a ligature above the wound, so tight as to check the return of blood through the veins, and of extracting the poison by the use of a cupping glass or suction over the wound. The Roman armies, in the time of the Parthian and African wars, were furnished with poison suckers to extract the poison from arrow wounds and serpent bites in this way. And it was then observed that the operator never experienced any influence from contact with the poison, unless he was at the time afflicted with fissures or ulcers about the lips or tongue. Animal poisons never affect the system through the medium of cutaneous absorption. They may even be taken into the stomach and digested there with perfect impunity. After a reasonable perseverance in the use of suction by the mouth or cupping-glass, the wound should always be fully cauterized with the nitrate of silver, and defended with an unirritating plaster. The internal exhibition of pure ammonia, or of the carbonate, has been recommended by high authorities, for the purpose of protecting the system from the absorption of the rattlesnake virus, but in city practice we can have no opportunity for testing its value.

Hydrophobia, or Rabies Canina.

The subject of hydrophobia has been so extensively treated of by medical authors, that we need only consider, on the present occasion, its surgical bearings. Although the bites of rabid animals are by no means so uniformly productive of hydrophobia as is imagined by the public, there can be no doubt as to the propriety of our taking advantage of all precautionary or preventive treatment, in every suspicious case. Although only one out of every sixteen or twenty cases of this class of wounds, as they occur to us in practice, ever becomes afflicted with the constitutional disease; still, rabies is so terrible a calamity in every point of view, as to put all temporizing modes of treatment out of consideration. The moment a patient

applies to us, with a bite made by an animal suspected to be rabid, it is our duty at once to apply a ligature firmly around the limb above; if it have occurred on the trunk or head, to apply a large exhausted or cupping glass, the edges of which will answer the purpose of a ligature to the blood-vessels, while at the same time the vacuum will draw out the virus along with the blood. Immediately afterwards, an incision should be made entirely around the wound, and the whole of the injured part dissected out, along with the sound skin and flesh for several lines around and below it. In most cases, as the wound will be superficial, it is only necessary to pinch up a fold of the skin including the wound, and then shave out the whole substance around the injured parts, by a sweep of the knife. After a subsequent sponging with warm water, and suction of the wound thus effected for a few minutes by the mouth or cupping glass, so as to promote a free discharge of blood, it will then be proper to sear the whole surface with the actual cautery, or to burn it with nitric acid, or lunar caustic.* If the hand or fingers have been bitten, in such a manner as to render it impossible to excise the parts fully, it will be proper to perform an immediate amputation just above the injury. To render such a severe operation proper, however, we should be possessed of strong reasons for deciding that the dog was rabid before inflicting the injury.

The period of incubation, as the interval is called, which elapses between the reception of the wound and the occurrence of the con-

* Notwithstanding the high authority of Mr. Youatt, who depends upon the free application of lunar caustic alone to the fresh wounds, we must conclude that experience goes in favor of the previous excision in the human subject. About twenty-three years ago, a rabid dog bit three persons on the same afternoon in Southwark. One of them, Mr. Robeno, the tailor, fell into my hands, and within an hour after the injury, I excised two flesh wounds from his left leg, and after promoting a free hemorrhage under a tight ligature above, and constant sponging with warm water, I seared the surface thoroughly with solid lunar caustic. I kept the wounds discharging for about a month afterwards, and he was fully protected from all subsequent inconvenience. One of the other two sufferers fell under the care of my friend, the late Dr. Harvey Klapp. She was a timid woman, and would not allow of the excision. He, therefore, depended upon the cupping glass and ligature followed by the application of lunar caustic. But she fell into convulsions and genuine hydrophobia in a fortnight afterwards, and died notwithstanding every effort which could be made for her relief. We could get no satisfactory account of the other case, which was reported to have occurred in the person of a negro child, in the lower part of the same district.

stitutional symptoms, is so various in different cases, that it will always be impossible to pronounce when the patient is perfectly safe. The system sometimes becomes affected in a few days, and before the wound is healed. More commonly, however, the bites are perfectly healed long before the development of any general disease. The interval is often many months in length, and authentic cases have been recorded of from nine to twelve years. Such facts, if they are to be taken as such, go to prove that the virus may become encysted in the circumscribing barrier of lymph, like a musket-ball, and remain dormant for an indefinite period, until finally some new excitement forces it into the circulation.* Some, however, are inclined to believe, that there must have been a mistake in the observation of all such protracted cases of incubation, and that a new inoculation must have eventually occurred in some undetected manner. Certainly nothing can be more distressing to an inquiring and intelligent patient, than a knowledge of this uncertainty in our pathology. As a general rule, however, we may de-

* The opinion of our profession is decisive upon this point, and hence it will become our duty to exise even an old scar from the bite of a suspected dog, whenever any unnatural appearance or sensation is complained of in it, or about it. The late Dr. Mitchell, of Bucks county, sent for me many years ago to consult about three scars on one cheek, and two on the back of one hand, in the person of a little boy eight years old, on the Neshamony. It was about three weeks after the injury, and although the wounds were superficial, and had healed kindly after a single application of lunar caustic, three of the cicatrices began to turn blue and became prickling or painful. The family had, moreover, ascertained that several animals bitten in the neighborhood by the same dog, had become rabid. I therefore excised the cicatrices completely, and burnt them thoroughly with lunar caustic, and the boy continued for six years afterwards free from the disease.

The notion that a local zymosis or fermentation is necessary for the development of the poison, and that it may take place at indefinite periods of time, before it affects the constitution, is not at all satisfactory to a rational inquirer. How far a general fermentation may extend its influence, like yeast in a mass of leavened dough, after its admission into the circulation, we cannot undertake to decide. The experiments of inoculating animals with the blood taken from hydrophobic patients have not, to my knowledge, been successful. The salivary secretions, however, of human sufferers, have been found to contaminate dogs, and lambs are said to have taken the disease from the milk of rabid ewes. In fact every animal, capable of contracting the disease, can also propagate it. These facts argue in favor of the zymotic doctrine of late authors; but they do not disprove the idea that the virus may be locally circumscribed or encysted around the wound, where it has been inserted, and remain there innocuous for an indefinite period.

cide that if, after a few months, the cicatrix puts on no livid or other unfavorable appearance, and the nervous system continues free of all pain and embarrassment, the patient is safe. Immense importance should, in the mean time, be attached by the practitioner to every means of diverting the sufferer's mind from all allusion to the circumstances of his case. Every kind of agreeable and active employment should be devised for him, and if possible he should be induced to undertake long journeys in delightful company.* It will not do to allow any such patient to dwell upon his internal sensations. If great pains be not taken to prevent that habit, he will become nervous and hysterical, so as finally to simulate, if he does not engender all the symptoms of hydrophobia. Indeed there is good reason to believe, that false or spurious hydrophobia has been more common in the practice of medicine than the real disease. Such ridiculous mistakes have certainly been made by unreflecting journalizers, that now many suppose all the reported cases of cure must have been imaginary.†

* I speak feelingly upon this point, because I was bitten about twenty years ago by a suspected dog. An enormous mastiff belonging to Mr. Snyder, the fancy chair maker in Walnut street, although he had caressed me a hundred times before, one day sprung at me as I was passing his kennel, and seized my left forearm with prodigious force. He drove his tusks through all my winter clothing on that arm, and sunk deep pits into the skin, in the form of small contused wounds. Although the cutis vera did not slough away, still the cuticle and rete mucosum was entirely abraded, and superficial sores remained there for three weeks. The noble old animal died the next night afterwards in convulsions, after terrible howling and tossings on the ground. It was, therefore, a very alarming affair, although my friends all insisted upon it, that the dog had not died of rabies, but probably from poison administered by some of the neighbors, to protect themselves from similar attacks. I flattered myself that the saliva had been all absorbed by my coat and overcoat sleeves, but nevertheless, continued for a long period apprehensive of consequences. For months afterwards, whenever I suffered my mind to dwell upon the circumstance, I could feel pains in the cicatrices, and finally they were discovered to turn dusky or livid. Under a severe application of lunar caustic they recovered their natural appearance, and after a long journey to the North, and attendance upon the cholera of 1832, I forgot the mad-dog.

† The case published by Dr. Smith, several years ago, in the Baltimore Medical Journal, and copied into most of the other periodicals of the day, as a cure of hydrophobia by the use of the diacetate of lead, was one of the hysterical form in a female. Dr. Smith himself was afterwards under my care for a bad fracture in his own person, and candidly explained all the peculiarities of the case. He was a very young practitioner when he published it, and that was the only case he had ever seen. It came on altogether too suddenly for real hydrophobia,

When true rabies has once been developed in the system, it may be regarded, so far as professional experience has gone, as incurable. It still remains the chief *opprobrium medicinæ*. But something may be done in the way of palliating its horrors. Large doses of opium by the mouth and the rectum, the endermic application of the salts of morphium on blistered surfaces, especially down the spine, and the repeated use of prussic acid in full doses, have all contributed to the relief of the agony and spasms. The idea that any serious advantage can be derived from applications or surgical operations about the throat, for the spasms and obstructions in that region, is illusory, because the brain and spinal cord are always at the same time found to be fatally engorged. In fact the whole blood is contaminated, and symptoms of incipient disor-

exactly like a sudden outbreak of hysteria. The intervals between the paroxysms were, moreover, destitute of the irritability and distress of mind so peculiar to hydrophobia. She was lively and cheerful occasionally, and could forget her disease when not laboring under the spasms.

Genuine hydrophobia always comes on, according to my information, gradually, and is preceded by premonitory symptoms. The fairest specimen of a genuine case occurred to me five years ago in North Front street, above Poplar, in the person of a beautiful boy, nine years old, the adopted son of Miss E. Martin. He had been bitten on the cheek by a neighbor's dog in July, in consequence of which the dog was immediately killed, but no excision was performed upon the bites, nor was anything else done for the patient, excepting mild dressings and the administration of skull-cap tea. In about ten or twelve days the child began to droop and show feverish symptoms, and the three cicatrices on the cheek became dusky, hard and painful. By degrees, the little fellow grew low spirited and languid. A soreness of the throat and a difficulty about the jaws were next complained of, and in about twenty days after the injury, he fell into terrible convulsions on attempting to swallow a cup of milk and water. I was then sent for, and found the boy looking anxious and affrighted, but still able to sit up and walk about the room. While I was conversing with him, a female friend brought in a cup of tea, and as he saw her pour a few drops out of a teaspoon into the cup, he went off into a violent general convulsion, attended with all the appearances of suffocation and spasm of the glottis. As he gradually recovered from this attack, his eyes were left protruded, his head and face engorged and livid, and his whole aspect horrid, and expressive of intense agony. As his trachea was oppressed with viscid mucus, I forced down a powder of sixty grains of ipecacuanha, and two of tartar emetic, in an emulsion of molasses and water, which vomited him profusely, and gave great temporary relief. On visiting him the same evening, however, I found he had just died. A neighboring practitioner had been called in during a severe paroxysm at dinner time, and ordered leeches to the throat. They bled largely till he fainted, and he soon afterwards sunk from exhaustion.

ganization appear throughout the system. If anything is to be discovered for the cure of this fell disease, it must be in the form of an antidote or neutralizer to the poison, before it deranges the composition of the blood. There is no propriety, however, in prophesying what animal chemistry, aided by the microscope, may not do in the way of developing new resources for our improving art.

The heroic treatment, or that which is supposed to overcome the disease by violence of impression upon the system, has been tried in every form by different practitioners. Enormous blood-lettings, followed in some instances by a substitution of warm water for the blood, by injecting it into the veins; cold water affusions protracted for a length of time, or the hot vapor bath carried to extreme prostration, and followed by cold affusions; prostrating doses of belladonna, stramonium, and tobacco, in all their forms of exhibition; mercury and antimony in inordinate quantities; actual cauteries down the whole course of the spine; and everything else which could be devised for making an overwhelming impression upon the system, have been tried with an equal want of success. It would appear that such treatment breaks down the energies of life instead of the disease, and that it is impossible to induce the system to react after their use in sufficient quantities or extent to overcome the violence of the symptoms. Hydrophobia must be considered as a much worse disease than even tetanus in this respect, because tetanus is not accompanied with such a disorganized state of the blood as to prevent all possibility of recovery after overcoming the spasms.

The notion that some have appeared to advocate, of there being two species of hydrophobia, chronic and acute, arising from different contagions in the dog tribe, and subject to opposite methods of treatment, is a great mistake in surgery. Depletion can do no more towards curing one set of cases, than stimulation in the way of relieving the other. All, all real cases of this horrid disease are beyond the reach of our efforts; and we must, at present, confess our inability to attain to its mastery.*

* It is distressing that we are now compelled to minister, in some degree, to the vulgar prejudice and horror against coming in contact with rabid human subjects. The experiments of Magendie and others, have fully substantiated the fact, that saliva from a hydrophobic man can reproduce the disease in dogs; and there can be no doubt as to the possibility of patients inoculating their attendants. But the shocking treatment to which an extension of this idea must

Poisoned Wounds from Dissection.

So greatly do the effects of wounds received in dissection depend upon the condition of the constitution which is exposed to them, that many sensible practitioners have believed that there is no such thing as a true septic poison contained in dead bodies. Fresh students who begin to frequent the dissecting room in the early part of every season, are as well able to bid defiance to every morbid influence therein to be encountered, as the hearty laborers about the offensive slaughter-houses and glue factories of the outskirts of our cities. In the latter part of every session, however, when the system has been rendered irritable and infirm, from laborious exposures and sedentary habits, in ill ventilated apartments, it is a very common thing for anatomical pupils to present troublesome inflammations from the slightest punctures received in the dissection of subjects not likely to be affected with any specific virus. Diffuse cellular inflammation, complicated often with affections of the veins and lymphatics, and frequently, also, with erysipelatous derangement of the skin, arises under such circumstances, and may easily be confounded with the effects of a morbid poison. Debilitated constitutions may, on the same principle, receive injurious impressions from the respiration of putrid animal effluvia, although the robust and hearty always bid defiance to such exhalations.

Cases, however, do occasionally occur, in which there is evidently a contamination of the blood from the influence of some morbid poison received through the medium of both incised and punctured wounds in dissection. The bodies of patients who die of peritoneal fever and other malignant diseases of a similar character, which have been attended with an erysipelatous or diffused inflammation of the serous membranes, are very apt to produce

occasionally subject the unfortunate, is truly deplorable. I was once more distressed in witnessing a case of this kind than at any occurrence that ever happened to me. I was called over into New Jersey, three years ago, to see a poor man who had been tied up to a tree in the woods, for two entire days, on account of the fears of the neighbors; and when I arrived there, I found they had gagged his mouth with a large stick of wood, bound firmly around his neck, and tied his hands and legs with cords, preparatory to carrying him on straw in a cart, to the hospital. Another case happened about the same time, at Chestnut Hill, where the poor sufferer was thrown, bound and chained, into a cellar, and left there two whole days and nights to starve and die.

dangerous, if not fatal consequences to the anatomical investigators who allow the morbid juices to come in contact with abraded or wounded surfaces. The strongest proof that there must have been an absorption of some septic or contaminating matter in such cases, is derived from the fact that often the constitution becomes dangerously affected with malignant symptoms before the occurrence of any local irritation about the wound. When local symptoms begin to occur, they are, moreover, often developed at points remote from the place of absorption. Thus, instead of the punctured finger or arm inflaming, a tumefaction will sometimes commence in the arm-pit, or down the side of the thorax, or, perhaps, even at more remote situations on the affected body. This tumefaction, and sometimes there will be successive patches of them, will go on to malignant and infiltrating suppuration, and speedily prostrate the energies of life. In many instances, however, of actual absorption of morbid poison, the irritation will begin at the wound, and after traveling up the course of the limb, finally affect the system in the same manner as has been just described. We distinguish the cases of simple irritative and diffused inflammation of the cellular tissue and lymphatics, from those complicated with morbid contamination, chiefly by the absence in the former of remote symptoms of development, and of a less rapid decline into an alarming state of prostration. The condition of the system in the former class of cases is that of common irritative fever, while that of the latter is more analogous to malignant typhus fever of the putrid type.*

There is no occasion for dilating at present upon the diffused inflammations of the cellular tissue, resulting from punctures in irritable subjects. Such have already been explained under the head

* Three of my private pupils were affected by dissection wounds in one winter. They all occurred in the latter part of February. Two of them were injured by the spicula of the ribs, which they had partly broken asunder in laying open the posterior portion of the thorax, in a consumptive subject. They both exhibited all the signs of contamination of the blood from absorption of the septic poison, and were in a very dangerous state of typhoid prostration for weeks before they recovered. Although they had repeated swellings and infiltrating suppurations along the course of the affected limbs, the punctured parts did not especially suffer. The other case, which occurred in the person of Dr. Byington, now of Johnsonsburg, New Jersey, was the result of irritative inflammation of the cellular tissue—and the organization and use of the affected finger were permanently destroyed by the violence of the local inflammation.

of consensual or symptomatic erysipelas of the skin lying over the parts affected with traveling cellular, and venous, and lymphatic inflammations. The treatment consists wholly in allaying the constitutional irritability by vapor baths, or by cooling lotions, by opiates and antimonials, combined with mercurial laxatives, and in combating the local inflammations by topical depletion and emollients, followed, whenever necessary, by free incisions, to prevent strangulation and infiltration of purulent fluids.

In regard to the cases which result from actual absorption of morbid matter into the system, we should recollect that two different forms have been established by competent authorities. By far the most dangerous and immediately fatal form, is that which results from the poison of subjects recently dead, and from whose blood the halitus or aura has not fully escaped. Some diseases are characterized by an odor as distinct from each other as occurs among different animals in health. The fomites of the clothing worn by patients who have labored under malignant fevers, is not more offensive or dangerous than the similar exhalation of a sickly and nauseous odor which so frequently offends us in recently exposed corpses. The post-mortem examination of all such cases should be postponed, not only until the offensive halitus has departed, but even until putrefaction has commenced. It is thought by those who have investigated this matter, that putrefaction destroys the peculiar and malignant poison developed in the bodies of patients who die of certain diseases. The results of putrefaction itself, however, sufficiently often prove injurious to those who are exposed to them, and these constitute the second form of septic poison affecting the system through the medium of absorption. It is not necessary even that wounds should occur in order to render the human system liable to the injurious effects of putrefactive odors. They may be absorbed through the skin and sound mucous membranes, especially by the medium of respiration. All the washings and changes of clothing which dissecting room pupils may resort to, will never render them fit for entrance into general society. The effluvia which they necessarily imbibe during their filthy though praiseworthy occupations, will be exhaled for days afterwards from their persons either in the form of expiration or transpiration. Very debilitating effects generally result in the constitutions of such individuals, and every precaution should always be taken by them to prevent the supervention of putrid fevers, or their associated

forms of disease. Experiments by injecting putrid colluvies into the veins of animals, have fully proved that the same influences will result from a direct contamination of the fluids. We may take it for granted, therefore, that our most implacable solidists must now give way to the old fashioned humoralists, so far as to allow of the contamination of the blood by the influence of a poison derived from the putrefaction of animal substances. The local treatment of these classes of wounds does not differ materially from that of common punctured wounds in irritable subjects. The same care ought always to be taken to insure the closure of the opened cells of the areolar tissue, by the promotion of a free discharge of blood, and the subsequent application of lunar caustic. Wherever we have reason, however, to suspect the danger of morbid absorption, we should always apply a ligature temporarily above, and employ warm water embrocations and suction, to promote a discharge of the poison before the application of caustic. It is an excellent preventative in all cases, to smear the hands thoroughly with oil, especially before opening the cavities of every subject. After the development of disease, the local symptoms should be treated exactly as we manage those of diffused inflammation of the cellular tissue and lymphatics, except, perhaps, that so much depletion can never be borne. In the putrid diathesis resulting from absorption of morbid poisons, we may attempt to eliminate the putrescent matters by exciting all the secretions and exhalations, but it will rarely be proper to deplete in any shape. On the contrary, ammoniacal and vinous stimuli will generally be required, along with opiates, and diluents, and nutritive broths. Great pains should always be taken to make timely and free incisions over all tumefied parts, and wherever we have reason to suspect the subjacent lodgment of matter.

MALIGNANT PUSTULE.

The absorption of morbid poison from the bodies of domestic animals, especially of the ox tribe, which have died of malignant diseases, is also capable of contaminating the human system. In the unmanageable milk sickness of the newly settled districts of the west and south-west, it is a very common occurrence. The disease not only results from flaying the carcasses of the animals which have died of the endemic, but also from a consumption of

any article of food into the composition of which either the flesh or the milk of an affected animal may have entered.* In its most malignant form, the disease speedily proves fatal, by a general

* Five years ago last July, a lady returned to town from her country lodgings in Bristol, Bucks Co., in a great fright, with her children. She imagined that they had all been poisoned by eating a custard pudding made of the milk of some cows affected with the trembles, or milk sickness. She and two of her children had been seized with violent vomiting and purging the night before, along with several of the other boarders in the same house, and the hotel keeper and neighboring farmers had been obliged to take their cows off from the meadows, and feed them on hay in their stables, to prevent an increasing mortality among them. In about a week afterward, I was sent for to Bristol to attend, in consultation with Dr. Dodson, a young man who had been poisoned by cutting a finger while flaying a cow that had just died of the milk sickness, on the meadows beside the Delaware. His companion, who had been contaminated on the same occasion, had died the day before, with sudden prostration and mortification of one arm, from the extension of two large carbuncles on the forearm up to the axilla. I found the sufferer laboring under great anxiety and depression of spirits, with a sighing respiration, a weak and hurried pulse, and a cadaverous countenance. He had one very large gangrenous vesicle, as large as a twenty-five cent piece, on the back part of his forearm, and two smaller ones lower down the same extremity. There was a large depressed pit in the centre, and the base was large, purple, and indurated. Tender and red lymphatic cords or streaks were seen and felt, running up along the arm to the axilla, and the whole integument of the limb had begun to tumefy and become hot. There was no development of inflammation at the situation of the slight wound on the thumb, or in the neighboring parts. The same thing was reported to me of the other case, which had already terminated fatally, from the inoculation of a scratch or abrasion of the hand by the same carcass. I first made crucial incisions across the large vesicle, entirely through the skin, and then applied the caustic potass freely, so as to char fully the whole of the carbunculous substance. I treated the two smaller vesicles in the same way, except that only a single incision was made across them. Emollient poultices of slippery elm, with laudanum, were then applied, and directions given to apply the pure nitric acid in case the surfaces did not speedily assume a suppurating aspect. Full doses of carbonate of ammonia were given internally, with quinine; and brandy, with nutritious gruels. In a few days we had the pleasure of hearing that the patient was getting well, and he did eventually recover. I had no time to visit the low grounds on the Delaware where the affected cattle had been fed, but the neighbors insisted upon it that a species of bog grass or weed, which grew there after a very rainy season, in the preceding spring, was the cause of the milk sickness. In the western country this disease is generally attributed to the poisonous qualities of the rhus vernix, or low dogwood. Dr. Dodson was not aware that any specimens of that shrub had ever been found on the meadows in question, nor could I get any better information on the subject.

prostration of the vital forces and decomposition of the blood. In a more mild or chronic form, it gradually undermines the constitutional powers, and produces an elimination of carbuncles, or malignant pustules as they are called. In most instances the eruptive affection presents more of an appearance of discolored vesicles situated over a swollen and indurated base, than of pustules. The method of managing the constitutional symptoms of this disease is to stimulate with ammonia, wine, and quinine, at the same time that the general irritation is kept down by appropriate external applications and anodynes. The pustules, or vesicles, should be promptly extirpated by excision or strong escharotics the moment they make their appearance, and suppuration promoted in the consequent wounds by emollient poultices.

The glanders must be a very rare disease in this country; so also must be the genuine farcy, which is regarded by the veterinary surgeons as the predecessor or parent of glanders. The farriers constantly mistake, in this city, inflammatory wheals or tubercles of the skin on horses in an inflammatory condition, for the lymphatic tubercles which constitute the farcy of authors. Still, however, it cannot be doubted that the same causes which produce the poison of farcy and glanders in Europe, must occasionally operate here. The crowded and ill-ventilated stables of our city, rendered exceedingly offensive by subjacent loads of manure, may generate the disease in any climate. We have abundant reason, however, to believe that other causes of contamination may operate upon the persons of farriers and flayers of dead horses, than the poison of true glanders. Malignant pustules, in all respects like those which proceed from the diseases of the ox tribe, are occasionally produced from inoculation by living as well as dead horses.*

* Some years ago an Irish groom, living in Gaskill street, applied to me for a large gangrenous looking vesicle on his left arm, which he said had originated from getting an abrasion on one of his knuckles smeared with the discharge from the nostrils of a distempered horse. His constitution was laboring under severe irritation and fever, and his arm was excessively painful and tumid, with inflamed lymphatic streaks. I destroyed the carbunculous vesicle with pure nitric acid, and directed emollient applications of slippery elm and lead water. After a few doses of calomel, with antimony and morphia, the irritation subsided, and he recovered, with a large, healthy and suppurating ulcer. I never saw but one case of a discharge from the nostrils in a human subject, after contamination from a distempered horse, and that was a groom in Mr. Carter's stables, in Prune street. He recovered after smearing the nos-

The poison of glanders can be transmitted through the human system in the same manner as through the bodies of other animals, without any loss of its contagious qualities. Although it presents modifications in the mode of developing some of its outer symptoms or manifestations, still the virus taken from the nasal discharges of an affected man can always reproduce the disease in a healthy horse, by inoculation. In the acute form, it is one of the most dangerous of diseases; but in the chronic, it can occasionally be trated successfully by nearly the same methods we resort to in other morbid poisons of the blood. Great care must always be taken to make early and free openings into the abscesses and pustules, and to apply powerful caustics. The lymphatic ganglia, when affected, must be dissected out, and the ulcerated surfaces of the nostrils and skin should be frequently washed with creasote.

SYPHILITIC POISONS.

It will prove impossible to do justice to this extensive subject, in any general treatise on surgery. We must content ourselves, therefore, on the present occasion, with an abridged condensation of the most important points that are connected with this department of practice. The history alone of the various doctrines, modes of management, and different forms of this poison, as it has prevailed among most nations from the remotest periods of recorded time, would fill more pages than we could afford to devote to the whole circle of medical literature. The chief cause of all the diversities of opinion which ever have prevailed in connection with this subject, may be attributed to the restricted or limited notion which most have entertained, in regard to the unity and specific character of venereal poison. Although it would appear almost an absurdity to suppose, that every form of chemical reaction which may take place among the combined and neglected secretions of the human organs of genera-

trils as high up as possible with lunar caustic solution, and afterwards injecting creasote emulsions every day for two weeks. Whether the common horse distemper of our country ever degenerates into true glanders, I am unable to decide. Certainly the disease is more tractable, under proper management, than the glanders is described to be in the works of veterinary surgeons in Europe. I never saw the true farcy, which consists of suppurating tubercles on the course of the lymphatic vessels. There can be no doubt that wheals and inflamed pustules of the skin have been often mistaken for the specific disease.

tion, could eventuate in the development of merely a single specific virus, still there has always been a decisive majority of the profession in favor of that conclusion. Even the great authority of John Hunter was added to its force; and even since the publication of his works, it has been difficult to convince practitioners that all the different forms of venereal disease cannot arise from one poison, modified in its influence by the organization of the different parts, and the peculiarities of each individual constitution. Guided by this opinion, it proved impossible for most medical men to form a satisfactory judgment concerning the great questions which had for so many years occupied the attention of authors and teachers. Was the venereal disease first introduced into Europe by the followers of Columbus after the discovery of America?—Was the disease ever cured before the introduction of mercury as a specific?—Can the disease be cured without mercury?—Is mercury ever necessary for the cure of syphilis?—Has not syphilis actually been produced by the action of mercury?—Has not mercury done more harm than good in this disease?—Cannot the disease be more easily cured without mercury? &c. These are the questions which at one time troubled the whole medical mind of the civilized world; and had not Mr. Carmichael come forward to the rescue of our intelligence, we should still have been called on to witness a continued deluge of useless and laborious publications upon the same illimitable subjects. He struck out the grand idea, that there must necessarily be as many kinds of distinct and specific virus as there are distinct and peculiar forms of the disease. He allowed fully for all the influences of organization and constitution, as well as of other circumstances in modifying the characters of each form of disease; but still he formed, from a careful consideration and comparison of all the diversified cases he had seen in his immense practice, the opinion that there are four specifically distinct kinds of disease resulting from as many distinct poisons. Although the majority of authors have not since given in their adhesion to his entire doctrine, all must admit that he has given a new direction and impetus to our inquiries. Ricord by his conclusive experiments, has demonstrated the existence of one virus, entirely distinct from all the other poisons, and we cannot doubt that others will finally be established on equally strong data. It is impossible from the very nature of things, that septic poisons should not vary. The elements and products of secretion vary in the different parts of the same complications of organs, even in the

same sex; and when we take into consideration the commixture of these secretions, after irregular and promiscuous intercourse between the most filthy and negligent of both sexes, we can experience no difficulty in concluding, that the chemical or putrefactive reactions which take place among them, must be productive of diversities of animal poison. Each form of the virus on being once generated, may continue to be propagated for an indefinite period by contagion: or it may finally wear out, or be lost for want of means of communication; and then a new species be formed afresh from another concomitance of circumstances.* In the same way we may conceive of a number of contagions going on collaterally at the same time, through different members of the same community, although not mixing with each other respectively. On the ground of such a conclusion, we can easily determine all the questions above alluded to. One species or more of syphilis, may have existed for ages before the time of Columbus, and yet a new and more malignant virus have been transported from this continent across the Atlantic. Mercury may have been found necessary for that form, although all the others had before been easily cured without it. At this time mercury is certainly not necessary for all the kinds of venereal disease, and it has even been demonstrated that all the existing forms

* Hunter's mind was evidently imbued with the same opinion I have expressed in the above text, and occasionally express it in different parts of his writings. Here is one paragraph, in page 57 of his work on the venereal disease, to the point. "The discharge from the vagina in cases of what is called fluor albus, is sometimes extremely irritating, in so much as to excoriate the labiæ and thighs; and the following history shows that it may sometimes produce effects similar to venereal disease. Mr. and Mrs. ——— have been married these twenty years and upwards. She has for many years past been at times troubled with the fluor albus. When he has connection with her at such times, it generally, though not always, produced an excoriation of the glans and prepuce, and a considerable discharge from the urethra, attended with a slight pain. These symptoms commonly take a considerable time before they go off, whether treated as a gonorrhea or as weakness. *Is this a new poison?* And does it go no farther because the connection takes place only between the two? What would be the consequence if she were to have connection with other men, and these with other women? Such cases, as far as I have seen, have only been in the form of a gonorrhea; they have not produced sores in the parts; nor, as far as I know, do they ever produce constitutional diseases." During the past twenty-five years, I have met with several similar cases to the above detail of Hunter, when in addition to a gonorrheal discharge, there were sometimes excoriations, and even pustules, on the glans, and prepuce, and wherein I had no reason to suspect the fidelity of either of the parties concerned.

can be cured without its use in any shape. It actually proves destructive to some, and often becomes more injurious than useful in other species. In fact it is only in one form, which always assumes a chronic or indolent condition, that it is positively useful; and in connection with the discussion of that species of syphilis, we shall have occasion to show that the modus operandi is useful, not on specific grounds, but on the same general principles that are common to all other diseases.

Like all other animal poisons, the different forms of venereal virus, when introduced into the circulation, produce a train of constitutional symptoms of greater or less regularity, and characteristic marks of an indisputable species, according to their durability of impression and the periods allowed for calling the different textures of the body into diseased action. Every virus which gains a rapid admission into the system, and produces an immediate effect upon the constitution, terminates in such tumultuous and dangerous excitement, as can hardly be arranged under any particular head of nosological arrangement. On the other hand, those which confine themselves a long while to the part with which they first come in contact, and are slowly afterwards propagated throughout the system, terminate in symptoms of a much more definite and characteristic form, susceptible of comparison and classification. Thus, hydrophobia becomes a specific appellative disease, while we have never been able to designate by any name the combination of symptoms which follow the bites of vipers or rattlesnakes. But the various syphilitic forms of animal poison are, under this law, especially amenable to classification, and each of their combinations of sequela will prove to be much more entitled to a specific name than are the symptoms of hydrophobia, or almost any other constitutional disease. They are all characterized, in general, by the development of primary symptoms in the parts where the impression is first made, after the progress of which through a definite period, the constitution becomes affected in such a manner as subsequently to develop a series of phenomena in certain appropriate, or, as it were, predestined tissues. A local zymosis, or yeast-like leavening of the part, appears to become necessary before the system can be contaminated by absorption. The cases, at least, in which the constitution has been contaminated without any discoverable trace of primary affection, are so rare that most investigators have decided the fact to be impossible. What changes are effected

in the composition of the blood, after the general zymosis which follows absorption of the veins, neither chemistry nor microscopical investigations have yet established. At one period an acid, and at another an alkaline reaction was thought to have been undergone, but none of the antidotes which have ever been suggested for any form of the disease, could ever be made out to operate as chemical antagonists to either of these principles. Whether future researches by the aid of the microscope, can detect any change in the organization of the nucleated cells or globules of the blood,* it is impossible to predict; but, fortunately, no such discoveries are necessary for our satisfactory comprehension of the pathology and therapeutical indications in the different cases as they occur to us in practice.

* The microscopical researches of Muller, upon the animalcular infusoriæ of the different animal contagions, have not been at all satisfactory to us. Even Vogel speaks very faintly of the *vibrios* and *tricomenas* which have been suggested as the true source of chancrous poison. Such animalculæ are not, in general, developed until after putrefaction of the animal secretions, and that process is always likely to destroy the specific character of vital elaborations. They may assist putrefactive juices in contaminating the blood with a putrid or typhoid disposition, but they can hardly be supposed to develop independent sources of contagion. M. Ricord, in his introductory chapter, has given Donné a thorough criticism upon this point, and proved, to his own satisfaction, that the vibrios could not have been the source of communication of chancres by inoculation. The matter of true buboes, in which no vibrios have ever been detected, proved inoculable in his hands. The animalcular origin of syphilitic diseases has been as old as the use of the microscope; and mercury was first brought into use for the cure of this disease, from its known efficacy in the way of destroying the parasitical worms of the intestinal tube. Of late, it has become much more common to see contagions accounted for by the transmission of the spores of parasitical vegetable fungi; and the opinion of Vogel, which embodies that of most of the recent German investigators, gives some countenance to venereal inoculations by the same mode. He says "that peculiar conditions appear to be requisite for the development and increase of the transferred germs —conditions which are, in general, only realized by pathological relations." "Hence it follows that they do not become developed on all points where the germs are deposited—their growth indicates a certain morbid disposition." But no observations with the microscope have as yet detected such germs in the circulating blood; and only three observers have, as yet, pretended to have distinguished infusoria, belonging to the mineral kingdom, in the human blood. Vogel evidently leans to the doctrine of infusorial inoculation. "It is not every form of infusion which, artificially (by inoculation) introduced into the circulation of an animal, develops itself further; this ensues only when the conditions are very favorable to their development, which is rarely the case; otherwise they are soon lost."

The symptoms of constitutional disturbance from the mere admission of the virus into the circulation, are not so striking as after all the other morbid poisons. Perhaps this fact may result from the gradual zymosis or leavening of the whole mass, accustoming the nervous system, by slow degrees, to the presence of the irritant. All that is generally complained of by the patient is a sense of uneasiness, or torpor, and lassitude, with occasional rheumatic pains, until just before the eruption of secondary symptoms, when horripilation or rigors and slight fever generally appear, and usher in the constitutional forms of the disease. Most patients, however, do not complain of these affections, and it always requires a close examination to detect them in cases which happen to be constantly under our notice.

Most pathologists have followed the arrangement of Hunter in his classification of the constitutional manifestations of the form of the disease which he especially investigated. True syphilis, according to him, manifests itself by the development of two classes or stages of secondary symptoms: first, the secondary symptoms in the first order of parts; and, second, the secondary symptoms in the second order of parts. The first order of parts included the skin and throat; the second, the bones and their appendages. The casual or occasional development of symptoms in other parts, as in the mucous membranes of the nostrils, eyes, mouth, and in the bursæ and joints, and ligaments, were regarded either as anomalous sequelæ of the disease, or as simulating affections from pseudo-syphilitic diseases, or the irregular action of mercury. Some have attempted to classify this irregular group of symptoms under the head of tertiary syphilis, and Ricord has gone so far even as to place under the same head the protracted stage of ulceration in the throat.* As we shall see, however, in the progress of our inquiries, many of these apparently irregular symptoms can be arranged among the consequences of other original fountains of morbid contamination, than the species which John Hunter has so luminously described in his immortal work as the true syphilis. It will be seen, moreover, that many of them are the result of irregular and perturb-

* Perhaps I should do Ricord injustice were I not to state, in connection with the above, that he classes all of Hunter's symptoms of the disease in the second order of parts, as well as the anomalous sequelæ, under the head of tertiary symptoms.

ating, instead of curative modes of treatment, in cases of some of the different forms of venereal poison.

It may appear disheartening to some who have cultivated medicine on empirical ground, to learn that no antidote or real specific has ever yet been discovered for any form of syphilis. Everything that has ever done good has produced its curative effects on the same general principles which govern us in the management of other diseases. A well regulated diet, blood-letting, purgatives, diuretics, and especially diaphoretics and alteratives, have all been brought under contribution with complete success, in the different stages and forms of syphilis. The aborigines of this continent were proverbially successful in their treatment of its worst shapes, by the use of simple diaphoretic herbs and roots, aided by the vapor bath. In fact the so long celebrated decoction of the woods, as they are called, was originally borrowed from the Indian practitioners near the earliest settlements on this continent. Alteratives, the class of remedies perhaps most extensively depended upon at present, produce their beneficial effects not merely by changing the actions of the solids, but also by influencing the secretions and exhalations so as effectually to eliminate the poison from the system. Mercury is only one of this class of remedies, and its great and peculiar advantage, as we shall see, consists in the fact, that it possesses extraordinary powers in dispersing chronic indurations and quickening the actions of the capillaries. In all cases where there is a want of indurated or unorganized lymph, or where the capillaries are in an over excited state, the alterative impressions of mercury will prove positively injurious; and then a simple course of diaphoretics, aided by appropriate antiphlogistics or tonics, as the state of the system may require, will prove as decidedly curative as any searcher after specifics can desire. But we must not devote too much space to such general discussions: we will proceed, therefore, to the consideration, in as succinct a manner as possible, of the particular forms and species of venereal disease. As the nosological arrangement and nomenclature of Carmichael are far more ingenious than any other that have ever been devised, at the same time that they are consistent with the facts and explanatory of the errors of Hunter, we will follow them in our present effort. He adopted the secondary appearances on the skin as the true indices of the distinctive or specific characters of the original poisons, and no objection can be

made to his nomenclature on the ground of inconvenience or confusion.

Lichen Syphiliticus.

1. *The papular venereal disease*, so called from the outer layer or papillary body of the true skin becoming irritated in the first stage of the secondary symptoms, and terminating in a dryness, roughness and furfuraceous desquamation of the cuticle. A decisive inflammation of the corpus papillare constitutes *papular* eruptions, or pimples on the skin, and as this sometimes takes place in this stage of the constitutional contamination from gonorrhea, Mr. Carmichael selected it as characteristic of the whole disease. By virtue of Hunter's favorite principle, the *consensus partium*, the mucous membrane of the throat, always sympathizes more or less with the skin. In the same manner, therefore, as in cases of measles and scarlatina, (affiliated diseases in some respects, with papular syphilis,) the cutaneous affection of this stage is accompanied with a sympathetic inflammation of the fauces, which never runs naturally into ulceration, but terminates in a chronic thickening of the membrane enveloping the tonsils, and the soft arches of the palate. Often the Schneiderian membrane becomes inflamed and thickened, and the palate and tonsils greatly enlarged. But no ulceration or suppuration occurs there, as in other forms of syphilis, unless the parts be irritated by severe catarrhs, or improper local and constitutional treatment.* These secondary symptoms generally occur in about six weeks after the first occurrence of the primary affection, or they may break out at any later period during its protracted progress in inveterate cases. Shortly after the development of these, and sometimes at the same period, pains are complained of in the head, back and joints; and finally, in the worst or most exasperated cases, bursal and synovial effusions, accompanied by a troublesome species

* When any degree of ulceration occurs on the affected mucous membranes in this form of constitutional disease, it is almost always superficial and extended irregularly over a large surface. It is what Mr. Carmichael called the ulcerous excoriation of the throat, and generally yields to two or three mild applications of lunar caustic. It is probably the same affection as that which is covered with a thin offensive scab in the cavities of the nostrils, and high up the pharynx. For this latter condition, repeated injections of a solution of chloride of soda, or of lime-water and warm milk, have first to be thrown up and through the nostrils by a syringe, for the purpose of detaching the scabs, before the caustic solution can be effectually applied.

of irritative, and chronic rheumatism, called gonorrheal rheumatism, begin to appear.*

If these symptoms are treated by a strict antiphlogistic course, beginning with purgatives, farinaceous food, and if necessary, bloodletting, and following these out with diaphoretics, aided by the occasional use of the warm or vapor-bath, the disease will be entirely overcome in about three or four weeks. Antimonials and diluent drinks, constitute in general the best diaphoretic and alterative course for this form of secondary affection. Swabbing the inflamed mucous membrane of the throat and nostrils occasionally with a solution of lunar caustic, and, if the skin continue harsh and dry, administering small doses of the arseniate of potass, will speedily alleviate these sequelæ of the disease. If any herpetic or scrofulous taint, however, whether of congenital or acquired origin, have been resident in the system, this disease is not so easily obliterated. The rheumatism is then very apt to run into an obstinate chronic form,

* Ever since the experimental inoculations of Ricord have so fully corroborated the assertions of Benjamin Bell, in regard to the specific difference between the matter of gonorrhea and chancre, it has been customary to deny the possibility of gonorrhea, and its occasionally accompanying excoriations affecting the system. Ricord in particular asserts that the rheumatism, which he appears to recognize as a common occurrence, is a complication and not the result of absorption or metastasis. The papular eruptions he mentions as an incipient stage of, or a complication with the genuine scaly syphilis. But, although papulæ may be associated with lepra and psoriasis, they often appear as an entirely distinct and separate form of cutaneous disease; and certainly I have seen them so often and repeatedly, as an independent affection during my experience, that I can no more doubt the character which Mr. Carmichael has ascribed to them, than I do the nosological title of the small-pox. Because the matter of genuine gonorrhea has not been successfully transmitted by the inoculations of Bell and Ricord, it by no means follows that it can never be absorbed into the system, so as injuriously to affect its functions and its health. The contamination which it produces is altogether milder and less disturbing than any other form of animal poison, but still it is, sometimes, actually efficient in the way of developing a distinct modification of constitutional derangements, following the course which we have indicated in the text. I have taken great pains since I first heard of Ricord's concealed chancres, "*chancres larvees*," to ascertain whether any cases of protracted and troublesome gonorrhea, were complicated with such an internal ulceration, and the result has been a thorough conviction, that gonorrhea does occasionally prove virulent in the way of producing the papular eruptions and their sequelæ, independent of all chancres. When an internal or external chancre is complicated with it, there will of course be always more or less danger of the subsequent occurrence of true scaly syphilis.

attended with scrofulous periostitis, and organic degenerations of the bones and joints. The eruptions on the skin, also, become more obvious and disfiguring, and frequently terminate in troublesome herpetic desquamations and defœdations, which sometimes simulate the secondary appearance of other forms of syphilis. The inflammation of the throat and nostrils at the same time becomes morbid and irritable. The tonsils and muciparous follicles sometimes in consequence become obstructed with foul secretions, or the Schneiderian membrane of the nose, and back part of the fauces superficially ulcerates, and becomes covered with an extensive and offensive scab. Whenever these conditions are mistaken for the true syphilis of Hunter, and are in consequence attacked with active courses of mercury, the most deplorable consequences are apt to follow. The bones become carious, the joints incurably affected, or the nose falls in, and the throat extensively ulcerates in connection with a distressing and emaciating hectic fever. If mercury is ever given at all, under such circumstances, it should be tried only in alterative doses or forms, and in combination with antimonials and anodynes, and diaphoretic drinks. In general an improved diet with a change of atmosphere, and a protracted course of sarsaparilla, aided by appropriate topical remedies, will gradually overcome these afflicting maladies. In extreme cases the preparations of arsenic, iodine, and of iron, have been very much relied on in this city; and after failure of every other treatment, a sea voyage, or a few weeks' residence at the sulphur springs of Virginia, have often been successful in relieving the rheumatic affections of the joints and fibrous membranes.

2. *Pustular Syphilis—Phlyzaciom.*—When the eruptions in the first stage of the secondary symptoms assume the form of distinct pustules on the skin, instead of papulæ or scales, we have every reason to regard the case as a peculiar form of disease. It will not be proper, however, to decide, from the appearance of a few sparse or scattered pustules on different parts of the surface, especially when they are intermingled with those of a different character. The follicles of the skin are liable to such obstructions and inflammation as may constitute pustules under a great variety of circumstances, and in connection with almost every possible form of disease. Such affections of the skin, however, are very different from the broad and full collections of purulent matter on the surface,

which constitute the *phlyzaceous** eruptions of the writers on cutaneous diseases, which characterize this form of syphilis. The eruptions are often large, with wide spaces of round skin between, and they are not extensively distributed over the body. In a few days after their formation, their orifices become ruptured, and the pus discharges and dries into a thin scab, which soon falls off, and leaves a superficial ulcer. The ulcers soon heal under mild dressings, and leave a dark colored cicatrix. The preceding febrile reaction is more severe than that which generally accompanies papular eruptions, and the sympathetic inflammation of the throat is also more serious. Indeed, ulcers generally form in patches on the soft arches of the palate and tonsils, and they are excessively irritable or painful. Mr. Carmichael describes them as occurring "on different parts of the fauces, in general of a white aphthous appearance." In most cases, however, they appear red and raw, or angry, and are at first destitute of granulations. There does not usually appear any other symptom of disease in the second order of parts in this form of syphilis, than occasional pains in the joints, attended with increased secretion of synovial fluid. Although Mr. Carmichael put down some nodes in his tables as a possible occurrence, he does not give any notice of them in either of his details of cases, and they certainly have not been met with among the practitioners of this city. Mr. Carmichael's observation in regard to the occasional intermixture of different kinds of eruptions in the same subject, is fully corroborated by Mr. Liston, who observes, "the papular and pustular eruptions are sometimes blended, a few pustules ap-

* Sometimes these eruptions put on the appearance of an *ecthyma*, and sometimes of a *favus*. I recollect the case of a young student at law, some twenty years ago, who had been cured by me in the winter, of a deep irritable ulcer, with elevated edges on the glans, accompanied with sympathetic or inflammatory bubocs, which did not suppurate. In about three months after I had cured him of the primary ulcer, he came to my office to inquire whether he was in any danger of the then prevalent varioloid, or small-pox. I looked at some large pustules and ecthymatous eruptions on his forehead and shoulders, and told him there was more danger of the big pox—the *gros nerole* of the French. He afterwards experienced rheumatic pains and a swelling of one knee; but got well under the use of sarsaparilla and antimony, with an occasional dose of Dover's powder at night. I have seen several other distinct cases of pustular eruptions in the course of my professional life, following irritable primary sores like those described by Carmichael, but this form of the disease has not been common in our country.

pearing among numerous papulæ, and *vice versa*. The pustular disease is not of frequent occurrence; and in proportion as it approaches the papular with desquamation, it becomes milder and more easily removed." He might have said, in addition, that it is always more severe and protracted when it approximates to the phagedenic form of secondary ulcers. Indeed, improper treatment, especially by mercurials, often converts the ulcers into exceedingly irritable and extending sores, which sometimes outstrip the phagedenic ones in their malignity and perverseness. In no stage of this species of syphilis is mercury applicable, except, perhaps, in the decline of the last symptoms, when it only proves useful as an alterative, to restore the deranged secretions and exhalations. The febrile excitement which accompanies the development of the symptoms, is always best treated by the use of antimonials and nitrate of potass, or muriate of ammonia in combination with diluent drinks; and the exhalations can generally be afterwards sufficiently maintained by the action of sarsaparilla and its adjuvants. The ulcers in the throat and on the skin generally yield to a few light applications of lunar caustic or creasote, and nothing but defensive applications are required in the form of dressings, to prevent the formation of scabs on the surface of the cutaneous sores. The pains about the joints should always be attacked with vapor baths, sarsaparilla, Dover's powders, and counter-irritants. The use of mercury never fails to prove injurious to them as well as to all the other acute symptoms of this disease.

3. *Tubercular Syphilis, or Phagedenic Venereal Disease.*—Mr. Carmichael describes the constitutional form of this disease as an eruption of tubercles, pustules, or spots, of a tubercular tendency, which quickly degenerate into ulcers covered with thick crusts, that usually heal in a peculiar manner from the centre, while, at the same time, they are extending at their circumference with a phagedenic border. Mr. Liston and most other authors, who have noticed the same points, omit the tubercular character of the eruptions as they first appear, but place great stress on the thick and prominent, or conical growth of the scabs, which resemble the *rupia prominens* of Bateman. The pustules of the former species, it should be recollected by way of comparison, are covered with very thin and easily detached scabs, which leave a bland and easily cicatrized ulcer after their removal. The ulceration which forms under the thick scabs of this form of disease, almost always begins

in the apex and centre of a tuberculous eruption of the skin, which speedily becomes softened down by the progress of the ulcer, and disappears on removal of the scab. The name tubercular syphilis, therefore, which was first given to it by Mr. Carmichael, was well deserved. The premonitory symptoms which precede these eruptions, are much more severe than in any other form of venereal complaint, and the accompanying fever is not only more severe, but persists longer after the eruptions have been developed. The ulceration of the throat which attends this disease, is also more formidable in its nature. It commences in the form of a small white aphthous-looking sore, which usually attacks the velum or posterior part of the pharynx. If not checked in its progress, it rapidly involves the entire pharynx, and extends upwards into the nares, where it produces an exfoliation of the spongy bones and tenderness of the ossa nasi, with a foul discharge from the nostrils. "This ulcer, in its progress towards the mouth, also affects the tonsils with a similar ulceration, and seizing upon the velum and uvula, rapidly destroys them. So that in looking into the mouth of a person in this lamentable state, there appears one vast continuous ulcerated cavity, covered with a white viscid matter, and extending from the palate to the lowest part of the pharynx." The most alarming form of this ulceration, however, is that which extends into the larynx. The root of the tongue and the epiglottis then speedily yield to its progress, and independently of the difficult and stridulous respiration steadily experienced from the thickening of the edges of the glottis and cavity of the larynx, the patient is hourly in danger of suffocation from the admission of food or drinks into the trachea. In the more chronic and protracted stages of this disease, patients are exceedingly apt to fall victims to a laryngeal phthisis from a thickening and suppuration of the perichondrium of the laryngeal cartilages. The secondary symptoms in the second order of parts are always irregularly developed, and continue, in general, for a much longer period than the ulcers. They are chiefly confined, however, to the joints and their appendages, and are always exasperated by the use of mercury. Indeed, the British army surgeons have all corroborated Mr. Carmichael's assertion in this respect. They agree that nodes are never produced in this disease except under the pernicious effects of mercury. Mr. Carmichael asserts, that in the whole of his experience he has not seen an instance of nodes attendant on the phagedenic venereal disease, ex-

cept where mercury had been previously administered. Obstinate enlargement of the testes is, also, not of unfrequent occurrence in this form of disease, and also other anomalous symptoms, such as large indolent swellings containing a serous fluid ; but Mr. C. never saw them, except where mercury had been largely employed, so that he had " as much reason to attribute them to the agency of the medicine as to that of the morbid poison, or more probably to the combined effects of both." Mr. Liston corroborates the same decision. " This medicine may interrupt the progress of the disease, may remove the eruption and ulcers in the throat ; but it, at the same time, transfers the disease to deep unyielding parts, to the bones and their coverings, and the fasciæ." In this city, mercury has never succeeded even in relieving the eruptions or the ulcers in the throat ; on the contrary, it has always exasperated them, except in their latter stage, when they have become decidedly chronic, and appear to be getting well of themselves.

The primary symptoms of this species of venereal disease appear in two forms. The first, or simple phagedenic form, begins, according to Liston, and according to our observations, either in a pustule or an abrasion, which speedily puts on a phagedenic appearance. It is singular that Mr. Carmichael had no opportunity of witnessing the very beginning of this kind of primary ulcer. In all his cases the injured part had assumed a corroding or phagedenic appearance before he saw it, and then it rapidly extended and deepened its surface until it destroyed large portions of the member upon which it occurred. Sometimes it destroyed the prepuce and glans in a few days, or, again, when chronic it spread deceitfully, healing at one part and destroying at another. When it extends equally all around, it presents irritable, jagged, and undermined edges, with a raw and worm-eaten base, which frequently lays open the blood-vessels, and produces a severe hemorrhage. When it extends in one direction and heals in another, it is less irritable and rapid in its progress, and only presents a phagedenic appearance on the extending edge.

The second and worst form of the primary ulcer in phagedenic venereal disease, is a combination of sloughing and phagedenic ulceration. A small, black and painful spot, not larger than a small shot, appears in the skin or mucous membrane, which rapidly enlarges, cracks, opens, and sloughs. The surface exposed under the slough never granulates or suppurates, as in cases of other ulcers in

a sloughy condition, but the exposed surface is always raw and phagedenic, and speedily falls again into sloughing. Thus, by an alternate process of sloughing and phagedenic ulceration, a rapid devastation is effected in the parts. If the disease is not speedily arrested by abortive treatment, the whole penis may be destroyed in a week. Indeed, in less time large masses have been destroyed even on the trunk and in the groins, so that the patient sinks under exhaustion from the pain and discharges. This horrible disease was called, by the British soldiers during the peninsular wars, the *black lion*, and by old authors it was called the black pox. Mr. Carmichael called it the sloughing phagedena. It certainly prevailed at that time as a distinct form of disease, and has, on two different occasions, broken out in this country almost like an epidemic. The opinion that it is nothing but common syphilis modified by intemperance, bad living, or bad treatment, is altogether untenable. Every practitioner who has witnessed the sloughing of common ulcers from irritation and debility, knows the difference between them. In the same way, it is always easy to distinguish between the appearance of local phagedena in scrofulous or mercurialized habits, and the whole progress of this terrible form of disease.*

* The phagedenic disease was very common here in 1818–19, and '20, just after the first republication of Mr. Carmichael's views by our medical press. It again broke out to a considerable extent in 1827 and '28, but has since very much declined. Indeed, it has of late almost entirely disappeared from this country. The only case I have seen for a long period, was a protracted secondary condition of it, from the State of Tennessee. Although it was very common in the Philadelphia Almshouse Hospital, when I was a house-surgeon there, I was never convinced of its being a distinct disease from syphilis, modified by intemperance and mercurials, until I began to meet with it in my private practice. The first case which made an impression upon my mind in favor of Mr. Carmichael's doctrine in regard to the distinct origin of this disease, occurred in 1829, in the person of an Irish schoolmaster, by the name of Kelly, in Filbert street. He was about thirty years of age, perfectly temperate, and apparently of good constitution. About a month before he called on me, he had contracted an ulcer on the prepuce, which, he said, had begun in the shape of a small pimple or pustule, but which speedily began to extend with a raw and sanious surface, in spite of all the emollients and soothing plasters which a young medical friend of mine had been able to suggest for him. He had taken a few blue pills, but without any perceptible effect on his system. I suspended these, of course, and prescribed antimonials, warm baths, fomentations, and soft poultices with watery solution of opium. When the irritation had been subdued by these measures, the edges became undermined and jagged, and as-

Since the publication of the earlier editions of Mr. Carmichael's work, a very great improvement has been made in the treatment of

sumed a distinct phagedenic shape. After two thorough applications of caustic potass to the whole morbid edge, the sore finally healed under the application of Turner's cerate, but not until it had destroyed almost the entire prepuce, and made a deep scar into the side of the glans. He had a sympathetic enlargement of the lymphatic ganglia in one groin, but leeches and blisters prevented suppuration and dispersed them. In about six weeks after he had been cured of these primary symptoms, he came back to me with an inflamed throat, fever, and flushed or mottled forehead and face. Blood-letting, purging, and antimonials, relieved his throat, but his face, forehead, and shoulders, broke out with hard lumps or tubercles, which pustulated in the centre and formed large and prominent scabs exactly like rupia. When these scabs were detached, unhealthy ulcers with undermined edges would appear, smeared with a viscid honey-like mucus. After burning them with caustic potass, most of them healed readily under soap plasters. But several on his forehead, breast, and shoulders, assumed the crescentic or horse-shoe form, and extended by phagedena on one edge, while they were cicatrizing on the opposite. At the same time rheumatic affections of the knees and elbows, attended with synovial affusion into them, and enlargements of the neighboring bursa began to appear. During the hot weather of August and September he went into the country, where Dr. Thomas Harris attended him in consultation with me, and confirmed my judgment in withholding the use of mercury. By the ensuing Christmas he had recovered from all the sores and swellings, under the use of sarsaparilla and conium, with occasional sulphur and vapor baths, and he finally went home to Ireland with nothing but emaciation and rigidity of one knee and one elbow remaining. But his healthy constitution and freedom from all suspicion of injurious mercurial influence, were not the only circumstances which made his case interesting to me. During the ensuing winter I had two frightful cases in the same neighborhood, which I had reason to fear must have originated from the source with his difficulties. At the White Bear Inn, in Market street, within half a square of Kelly's school room, and where I know the poor fellow had been in the habit of eating his dinner in ordinary, or, at least, occasionally, the then proprietor of the house, Mr. Caldwell, first sent for me to see a black and painful spot on his prepuce, which had broken open, or, as he said, burst the night before and discharged a bloody sanies and very offensive odor. I immediately discovered the first stage of sloughing phagedena, and having shortly before seen Mr. Welbank's paper in the Med.-Chir. Transactions, I tried his plan of treatment by applying the concentrated nitric acid. This succeeded like a charm. The moment the slough which it caused came off under a flaxseed poultice, a crop of healthy granulations shot out and repaired the breach. This succeeded in preventing all secondary disease, as it has done in every other case in which I have seen it tried as early after the exposure. But as soon as Mr. Caldwell had got well, one of his boarders, Mr. G. W. J., a wholesale shoe dealer in Market street, took to his bed and sent for me. He was a perfectly healthy and respectable young man, of twenty-six years of age, accustomed to no kind of dissipation. About a week after visit-

the primary symptoms of phagedena. Instead of the temporizing treatment recommended by him of blood-letting, fomentations, poultices, antimonials, purgatives and opiates, we now proceed immediately to destroy the whole morbid surface, by potential cauteries. A bridge of basilicon ointment is smeared around the edges, and over the surface of the neighboring skin, and then lint dipped in pure nitric acid is applied firmly over the sloughing or corroding surface. Emollient poultices afterwards speedily detach the sloughs

ing the same chambermaid, who had certainly infected the landlord, and probably the poor schoolmaster, he began to experience a distressing pain in the inner side of his right thigh just below the groin, in which region he soon detected a black speck or tubercle. This rapidly enlarged, cracked open, and discharged an offensive bloody matter. He had consulted the nearest apothecary, who gave him some balsamic mixture to apply on patent lint, but before I saw him the slough had extended to the size of half of one of his palms. I lost no time in applying a piece of patent lint, cut to the size of the whole surface, and dipped in pure nitric acid. A surrounding bridge of basilicon ointment protected the sound skin, and a poultice afterwards detached an enormous slough from a subjacent healthy ulcer. After this ulcer had healed without the development of buboes, I was confident that he would escape secondary symptoms; but, unhappily, in about three months he came to me with fever, and large wheals or tubercles on his forehead, face, breast, and shoulders, which scabbed over like rupia, and were followed, in some points, by enormous phagedenic ulcers. His throat and nostrils ulcerated, the spongy bones exfoliated, his joints became tumid and painful, and, finally, the whole category of symptoms laid down by Carmichael supervened. I had consultation on consultation with my professional friends, sent him to the sulphur springs, the seashore, and the country. But he finally died, after three years suffering, with marasmus and perichondrial swellings about the larynx, without any injurious course of mercury ever having been instituted. A few carefully conducted trials of an alterative course, at the suggestion of some of my consulting friends, failed in affording any more than palliative relief even in the declining stage of the symptoms.

But there were other women, at the same period, about town, who communicated this form of the disease. One of them, who lived in Quince street, affected a young physician from the South, with an irritable sore on the corona glandis, which finally assumed a phagedenic form, and destroyed the whole glans and prepuce, and was followed by a protracted train of tubercular and phagedenic sores on the skin, and chronic rheumatism of the joints, from all of which he subsequently recovered under the use of sarsaparilla and Swaim's panacea. The same female contaminated Thos. Dougherty, the superintendent of my then anatomical rooms, and produced a sloughing ulcer of the prepuce, which was not arrested until it had destroyed a large portion of the parts, and produced a horrid train of characteristic secondary symptoms, under which, in combination with intemperance, he sank in less than six months.

and present a suppurating and granulating surface. In short, this efficient plan of treatment at once converts the diseased into a perfectly healthy ulcer, and effectually protects the constitution from all contamination in most cases. The secondary eruptions being accompanied with much febrile reaction, always require depletion at first, and generally, in the form of repeated blood-letting and purgatives. Antimonials and diluents afterwards come in as adjuvants, and finally, sarsaparilla with Dover's powder, or other sudorifics. The ulcers on the skin should be cauterized with caustic potass at their morbid edges and surfaces from time to time, and emollient poultices of slippery elm applied until the surface becomes healthy. Afterwards soap cerate, or Turner's cerate, spread on lint or linen, will speedily effect cicatrization. If the ulceration be large and round or oval, the cicatrization will frequently begin in the centre, and gradually extend towards the circumference. It is even sometimes the case, that an insular batch will be healing in the centre, while the edges all around are extending by a slow or chronic phagedena. Mr. Carmichael thinks that the circumstance of an ulcer healing in this manner, "may be owing to the destruction of the cutaneous structure in its centre; and that the skin being here destroyed, the parts underneath throw out granulations, which soon cicatrize, while at the same time the ulcer continues to make progress in its circumference, in accordance with the pathological law so well known, that diseased affections as well as inflammation, extend in the direction of the tissues they first attack, leaving untouched other tissues in their immediate vicinity." In opposition to this view it has already been stated, under the head of burns, that the reason why some superficial ulcers begin to heal in insular patches in the centre is, that the substance of the cutis vera had never been destroyed there, while it had been more deeply ulcerated away around the edges. As cicatrization always commences at the skin, we can easily understand the reason why, in large ulcers, which have a portion of only excoriated skin in their centre, can begin to heal there even before their edges appear to be cicatrizing. Mr. Liston, in commenting on this phenomenon, takes the same view in his chapter on the phagedenic disease. "The reason for this unusual mode seems to be, that ulceration does not commence in the secondary sores, till the crusts which have covered them have been removed; they then are very superficial, not extending through the thickness of the true skin, and the ulceration does not go on in the

centre of the original sore, but towards its margins, so that a portion of true skin remains in the centre, when the surrounding skin which usually forms the new cutaneous texture necessary for reparation, is gradually and progressively destroyed, the remaining old skin in the sore assumes an excited action as in ordinary cases, and from it the new requisite texture is formed, and gradually extends over the surface until it meets with a similar substance, which has been produced by the surrounding skin after the ulceration in that quarter has ceased. Thus the general principle, that skin is formed by skin, is even in such cases found to be correct, the healing from the centre not following, as some have supposed, the complete destruction of the cutaneous tissues, but from its having remained unaffected, or nearly so."

The buboes which result from the primary sores of this form of venereal disease, are always more painful and irritable than those which occur from any other cause, and they require more general and topical depletion. When they have suppurated they discharge a sanious or gleety ichor, they present purple and jagged, and undermined edges, and frequently extend over an enormous surface of the groin and iliac region. The best treatment consists in the application of pure nitric acid, in the same manner as has been recommended for the primary sloughing ulcer. Sometimes, great relief is afforded, by paring away the undermined edges with the curved pointed scissors, and promoting a free hemorrhage by warm fomentations, and afterwards cauterizing the surface with the nitrate of silver.

Before we leave the consideration of phagedena, we must be allowed to express our gratitude to Mr. Carmichael for the great improvement he has afforded to us in common with the whole profession, by his publications upon this subject. Notwithstanding the cavilings of some flippant and inexperienced reviewers, he has deserved the meed of approbation from all the judicious and observing. Even Mr. Guthrie substantiated all the positions we have acceded to in regard to this disease, with the exception of its origin from a distinct and peculiar poison. In that particular alone he differed from Mr. Carmichael, but he certainly failed in convincing those of his readers who have ever encountered the disease in their practice, that it can be produced by any modification resulting from treatment, constitution, or climate.* Because Mr. C. candidly

* I do not doubt the position assumed by Mr. Guthrie and other such experienced authors, that local phagedena can be produced in irritable constitutions

acknowledged that he had not witnessed any of the simple phagedenic primary sores in their incipient stage, it is idle to assert that they could not have presented anything peculiar or different from true syphilis. The sloughing form of the primary symptoms certainly begins, as a distinct thing, from chancre, and experienced observers have since recognized an early and inherent irritability in the very commencement of a simple phagedenic sore. The great and distinguishing point, however, is, that while all other ulcers which have been thrown into a sloughing condition by any morbid influence, present healthy surfaces after the detachment of the slough, those which result from some peculiar venereal poison always run into a morbid and phagedenic state, unless the whole of the contaminated surface is destroyed by powerful caustics.

4. *Scaly Venereal Disease, or Lepra Syphilitica.*—This is the true syphilis of Hunter, and is the form which, as Mr. Carmichael and others suppose, must have been the result of the poison transported from this continent to Europe by the followers of Columbus. It has probably undergone some modifications since, at least as far as regards its malignity; but its general characters are still very well preserved, and its progress accords well with the original description of the earlier authors. Unfortunately for the accuracy of our conclusions in this respect, however, no distinction was made between its primary and secondary symptoms, until the time of Fernel, more than half a century after its reputed origin in Europe. Indeed, no full or satisfactory classification of the symptoms was ever adopted before the publication of Hunter's great work upon the subject, in 1784. Ever since that period, this form of disease has been well understood by those who have taken the trouble to investigate it; and all the confusion and want of conformity in opinion which have

by improper treatment, or habits. I have often seen sores forced into a phagedenic state by repeated irritating local applications, especially in intemperate and cachectic habits. Although mercury generally proves injurious to them while they are in an irritable or progressing state, it often becomes curative after their morbid peculiarities have been overcome. I recollect the case of a dissipated merchant's clerk, on whose penis an irritable ulcer had become phagedenic, under the improper use of mercury, before I was called in. After I had suspended the harassing remedies, and composed him by diaphoretics, warm baths, and sarsaparilla, my judicious and experienced old friend, Dr. Joseph Hartshorne, was called into consultation with me, and recommended the use of blue pills and opium. The combination then acted like a charm, and healed up the large stationary ulcer in a week.

been exhibited among the members of our profession, proceeded from the futile attempt at confounding different venereal poisons under the same species.

In from six to twelve weeks, and sometimes not until a longer period after the primary affection, the secondary symptoms begin to be developed in the first order of parts. There is less febrile reaction under this process than in the other forces of venereal disease, but usually distinct premonitory signs are complained of by the patient. Dullness of spirits, loss of appetite, and occasional pains about the head, neck, and limbs are frequently experienced a few days before the eruptions commence, and they are likely to return frequently during the progress of the disease. The skin at first appears mottled and rough, or angry, and occasionally this appearance repeatedly fades away, and breaks out again before the distinct and characteristic eruptions are fully developed.* These consist in oval or rounded scales of considerable size, which speedily become reddish, or rather they assume a copper-colored stain. These scales or patches are as soft and pliable as other parts of the skin, and not rigid or frangible, as the scabs of the other forms which we have described. As Willan says, "it is, however, proper to observe that every patch originates from a small, hard, reddish protuberance. As this gradually dilates, the increase of its circumference is not attended with an increasing ulceration of the centre; on the contrary, the sides of the patch are somewhat raised, and the central part of it appears a flat surface, covered with thin

* Mr. Liston's description, derived from an immense experience, is as follows: "The eruption which follows the chancrous form of primary sore is scaly from the commencement, and by this character is readily distinguished from every other venereal affection. It is generally preceded by an efflorescence or discoloration, rendering the skin of a mottled appearance. The scaly eruption is a form either of lepra or psoriasis. The patches do not usually exceed a sixpence in size, are distinct and separate from each other; their base is of a dark red or coppery hue; the affected skin is not hard or rough, but soft and pliable, and seldom covered with crusts; as they extend, the edges are slightly elevated, and the centre, which alone is covered with their white scabs, appears flattened and somewhat depressed; when they begin to fade, the margins shrink and become paler, and desquamation proceeds slowly; a circular purplish-red discoloration, with a central depression, remains some time after the blotches have declined; the depression is permanent, but the discoloration disappears. The smaller patches, which assume a variety of forms, continue for some time of a dark color, extend towards the circumference, become pustular, and at length ulcerate superficially, enclosing an area of sound skin."

white scales. The patches are generally distinct, and at a distance from each other. There is seldom seen any of them exceeding the size of a shilling; yet it is probable they might acquire a greater magnitude, if the progress of the disease were not arrested by the use of mercury. When the constitution is under the full influence of mercury, the sides of the patch shrink and become paler; the centre is also depressed, but the desquamation proceeds slowly, and the disease cannot be removed without a perseverance in the course for six or eight weeks. A circular red spot usually appears for some time in the place of every declining patch, and a minute shallow depression like a cicatrix is left in the centre, but no permanent discoloration of the skin remains as in some cases. The leprous form of the syphilitic eruption takes place like other venereal eruptions, at very different periods after infection in different cases. If no medicines were employed, it would at length terminate in ulcerated blotches." The above description, which is exceedingly accurate, refers to the larger class of syphilitic blotches, which occur chiefly on the forehead, breast, back of the neck, and in the groins and adjoining surface of the pubes. They are classified by Willan under the head of *lepra syphilitica;* but there is another class of smaller, more irregular, and less elevated scaly eruptions, which do not so readily ulcerate without the use of mercury. These latter are denominated by the same authority *psoriasis syphilitica*, and are like the lepra, scaly from their very commencement. The latter class of eruptions appear more closely crowded together than the former, and they sometimes occupy the intervening spaces between the larger ones. After the larger or leprous scales have ulcerated, thick and deforming scales will form over the sores by a desiccation of the matter, unless pains be taken to prevent that process by the constant application of plasters.*

There is another modification of the eruptions occurring between the nates, on the scrotum, in the groins and other similar situations where friction and moisture may interfere with the regular progress of the scales. Under such circumstances the eruptions become

* Carmichael says: "If mercury be not employed, the eruption proceeds to ulceration in the following manner. Each spot is covered by scales, or by scurf, which is thrown off, and succeeded by another; every succeeding scurf which is formed, becomes thicker than the preceding, till at length it forms a crust, under which matter collects, and then it becomes a true ulcer, in which state it spreads, but very slowly."

elevated in the form of tubercles. The English surgeons have generally called them condylomata, and some have confounded them with the genuine tubercular eruptions of the phagedenic venereal disease of Carmichael. Mr. Liston thus speaks of them, in his excellent practical work: "When depressions of the skin, as the folds of the nates, are affected, a scaly eruption does not take place, but soft and moist elevations arise, discharging a whitish matter, varying in form and size, and accordingly receiving various appellations, as condylomata, fici, and marisci. *From them a secondary form of disease is occasionally communicated.* If no decided treatment is resorted to, and if the eruption is consequently permitted to follow its own course, thick crusts form, ulceration proceeds beneath them, the matter is confined, and the batch becomes prominent." This particular form of eruption has been much more carefully noticed by the French practitioners than the English, and is well deserving of our attention on the present occasion. Ricord has investigated it very carefully, and appears disposed to divide it into two species, primary, or at least the most immediate result of the primary chancre, and secondary, as an accompaniment, or mere modification of the secondary symptoms. He denominates it the mucous pustule, (*pustule muqueuse*, *pustule plate*, *humide*, *tubercule muqueux*, *papule muqueuse*.) Acton, and most recent authors call it the mucous tubercle. They should not be confounded with the deep seated tubercles of the skin and mucous membranes, called the *lupus syphiliticus*, which occur in the tertiary form of the disease, and appear about the alæ and lobules of the nose, and sometimes show themselves on the glans, where they may easily be mistaken for the superficial mucous tubercles. Ricord has found them also on the tongue, cervix uteri, &c., which then resemble scirrhous, or carcinomatous indurations.

Of the mucous tubercle, Ricord observes: "This curious symptom, so obscure in its commencement, and so insidious in its progress, forms the connecting link between the regular and characteristic point of commencement of syphilis, chancre, and the symptoms of general infection. Similar in appearance to chancre, thought, like it, to be contagious, and perhaps the beginning of syphilis, it differs from it in the results of inoculation. It resembles the secondary symptoms, inasmuch as, like them, it succeeds to chancre: it may be inherited, but cannot be transmitted by inoculation."

Here it is difficult to understand Mr. Ricord precisely, unless he means to distinguish between contagion and inoculation. In a preceding paragraph he has asserted that the morbid secretion which it (the mucous tubercle) produces, has been inoculated with a lancet, applied to vesicated or rubbed upon denuded surfaces, retained on points of skin from which the hairs had been plucked out, but without any result; *and yet the contagion of the mucous pustule seems to be proved*, and in some individuals it seems to be the first symptom of syphilis. But contagions, by an intangible vital process, which cannot be explained, the mucous tubercle cannot be transmitted by inoculation. We shall have occasion to advert to these points again, under the head of inoculation, for the purpose of showing how unreasonable Mr. Ricord has been in denying contagious virulence to all such sores as he could not reproduce by inoculation, and that, too, in the very subjects afflicted with them. If he now allows mucous tubercles to be contagious by other means of contact than by inoculation, he must produce some stronger reasons than those derived from negative facts, to prove that other sores cannot be virulent, because they are not inoculable. It is a singular fact, but nevertheless a true one, that those tubercles are the only species of secondary eruption which ever prove contagious, and to account for the circumstance, the followers of Ricord have suggested that they must then have been directly contaminated with the matter of a chancre. But such mucous tubercles as have been hereditarily transmitted to infants, have contaminated fresh and healthy nurses in many cases, and under circumstances about which there could be no dispute. Mr. Liston expressed the opinion of most well-informed practitioners, when he asserts that "*from them a secondary form of the disease is occasionally communicated.*" This is the singular point of view under which they have always been regarded, and with which all the other secondary eruptions are so strongly contrasted. John Hunter proved, by direct and careful experiments, that the matter taken from all other forms of secondary sores was never inoculable or contagious, and the experience of Ricord has confirmed the same opinion. To account for this generally universally acknowledged difference between the contaminating qualities of primary and secondary ulcers, a variety of abstruse speculations have been indulged in by ingenious authors. Some, simply enough, have imagined that the virus must be dilated so largely in its passage through the circulation, as to prove barely

sufficient to excite the development of the secondary symptoms without enduing them with contagious properties. Others suppose that the venereal mode, or leaven, has undergone such a fermentation after its full absorption as to divest it of all its contagious qualities, although it can develop symptoms and propagate itself by hereditary succession to posterity. The majority, however, and especially the solidists, deny the possibility of all absorption of the virus into the system, and attribute all the consequences of the disease to nervous impressions and consequent sympathetic irritations.* This was the doctrine of the entire physiological school, including Broussais, its great founder; and traces of the same opinion may occasionally be found in the writings of Hunter himself. Ricord allows that lymphatic absorption preserves the contagious quality of the virus, until it is arrested at the first gland or ganglion; while the venous absorption, by which alone it gains access to the general system, destroys all its contagiousness. Microscopical researches have never detected its broken down, or granular pus globules, nor its vibrios or tricomonas in the blood ;†

* The eloquent Professor Chapman, in his zeal for solidism, used to assert, many years ago, as I am told he even does now, that the blood never could become contaminated with any foreign material, and that, when the sensible properties of some substances, such as nitre, asparagus, or turpentine, gain admission from the stomach into the urine, their elements must have been resolved or decomposed, before admixture with the circulation, so as to enter into new forms of combination with the proper constituents of the blood, while after reaching the kidneys, the same original elements were recombined in their original shape and constitution, so as to manifest their sensible qualities there!

† Perhaps the experiment of Vogel is worthy of notice here. He injected two ounces of the putrid fluid, in which an ape had been macerated for two months, containing myriads of infusoriæ all of one species, into the blood-vessels of a full grown cat. After the lapse of twenty-three hours, about sixteen grains of blood were drawn from the cat; they contained no trace of these infusoria. Two days afterwards, the animal was killed, and the blood carefully examined; it contained no trace of infusoria; they had all (notwithstanding millions had been injected) disappeared without leaving a vestige. The blood, however, presented a very decided increase of fibrin. Before the injection, the blood contained in 1000 parts, only 1.4 of this constituent; two days afterwards, the same quantity yielded 6.68 parts. Vogel says, "it is not every form of infusorium which, artificially (by inoculation) introduced into the circulation of an animal, develops itself further; this ensues only when the conditions are very favorable for its development, which is rarely the case; otherwise, they are soon lost." It is a pity that other experimenters will not learn how to draw their inferences as cautiously and modestly, from their isolated trials. Neither John Hunter, nor

nor has the blood or any of its secretions ever been found to possess the power of inoculating any subject. But, granting all these facts, there is still an insuperable difficulty in the way of deciding that the system is not positively contaminated by a commixture of the syphilitic virus. All of these secondary symptoms can be hereditarily propagated, not only from the mother to her children, but even the remote or tertiary symptoms of Ricord can be transmitted by the father to his children, even without intermediately affecting their mother.* It is by no means certain, moreover, that other

Bell, nor Ricord, appears to have made any impression upon his judgment, in relation to the subject of inoculation. He thinks it must take a great many swallows to make one spring; or rather, that the absence of the whole brood cannot serve to disprove the advent of a spring morning or noontide.

* I was once a thorough skeptic upon this point. But positive and satisfactory experience has long ago satisfied me of the truth of the statement made in the text above. About twenty years ago, Mr. K. A., of South Front street, first called me for the case of his wife, a very healthy and fine looking woman, then about twenty-five years old, who had miscarried six successive times, between the fifth and eighth months, under the professional care of the late Dr. Dewees. I attributed the difficulty at first to her plethora, grossness, and want of exercise out of doors; and her seventh pregnancy went to near the full time, in consequence of her restricted diet, regular use of cooling laxatives, and free exercise out of doors, according to my advice. She was, nevertheless, delivered of a dead fœtus in about thirty-four weeks after conception, and to my astonishment I found its body covered with discolored blotches or stains, and the cuticle universally peeled off or denuded. On inquiry of the nurse and grandmother, I then learned, that all the other fœtuses had been putrid, and covered with sores all over; which statement gave me the first suspicion of a syphilitic taint in the case. But on a careful examination of the mother's person, and inquiry into her history, I was fully satisfied that she was totally untainted. In a few days, however, the husband came to me with the acknowledgment, that he had been afflicted with a bad sore on his glands before marriage, for which he had been successfully treated by the late Dr. Lawrence. In a few months, however, he was afflicted with blotches on the scalp and back of the neck and thighs, and ulcers in the throat. For these he took several empirical remedies, and was twice salivated with partial benefit. The symptoms would occasionally recede, and afterwards break out afresh. Finally, he lost his soft palate, and the disease extended up the nostrils. He had in the meantime lost the spongy or turbinated bones on both sides, and the whole pituitary membrane was suppurating or scabbing, with a foul and offensive discharge, until he applied to me. He had, moreover, several large and extensive nodes on his shins, ulnar bones, and on one of his clavicles, with several pericranial tumours on his scull. Nine years had then elapsed from the first occurrence of the primary symptoms. I put him on the full use of sarsaparilla, with alterative doses of blue pill and ipecacuanha, and used the warm-bath and sulphur fumigations alternately, for several weeks.

secondary sores, besides the mucous tubercle, cannot sometimes, under favorable circumstances, propagate the disease to apparently sound constitutions. Because a thousand inoculations have failed, it does not follow that the matter of any species of sore can never be transmitted to any system, through the medium of a morbidly absorbing surface. There is no kind of morbid or putrescent animal matter that does not, under some circumstances, gain admission into the circulation of healthy persons, and consequently affect the system with a tendency to cachectic diseases. Even the teeth transplanted* from young and perfectly sound constitutions, almost

I afterwards followed these up with small doses of corrosive sublimate, in combination with extract of conium, and directed repeated fumigations of powdered cinnabar up and through his nostrils. Under this treatment, he finally got perfectly well, and has been healthy ever since. Nothing was done for his wife in the meanwhile. But she, notwithstanding, conceived again two years thereafter, bore a healthy, full grown child, which has lived and grown up since, and has produced to her delighted husband five others, all well and hearty, since. My brother, Dr. Samuel McClellan, has been the obstetrical attendant on all these occasions, and has never been able to discover any trace of syphilis in any of its forms, in any member of the family, with the exception of the somewhat flattened nose, and disfiguring, but sound scars on different parts of the father's person.

I have since had two other cases, equally remarkable, under my care: one that of a respectable house carpenter, and the other, that of a temperate and decent man, engaged in the livery-stable business. They had both been afflicted with the true scaly syphilitus, but the nodes and nocturnal pains had never been permanently relieved. They both, moreover, had swellings of the scalp, and occasional blotches and scabs on the skin of the scalp and shoulders. The wife of one had miscarried every year for four years; and the other, on two different occasions, without either fœtus having arrived at maturity. Still, both of their wives remained totally unaffected with any discoverable taint. After a well regulated mercurial course, both of the men recovered, and their wives have borne them healthy children.

I think I could not have been mistaken in my conclusion, in regard to either of the above cases, although I have been quite uncharitable in my opinions of all the other women who have been similarly situated.

Acton denies the possibility of tertiary symptoms descending hereditarily, but admits it to be the common belief, that they generate scrofulous affections in that way.

* The late Mr. Gardette, the most celebrated dentist of his day in this country, and father of the present accomplished dentist of that name in this city, published an instructive paper on this subject, in the Medical Recorder of 1827. He followed M. Lemayeur, a French dentist, who had transplanted 170 different teeth in this city in 1785 and '86, and was obliged to remove all those which had at first appeared to be successfully transplanted, on account of the local

always affected the subjects into whose alveoli they had been successfully inserted, with foul eruptions and sore throats, strongly resembling syphilis. The foul matter of many unhealthy ulcers has injuriously affected the very system in which they occur, by the medium of absorption,* and sometimes the same influence contaminates other subjects, to the absorbing surfaces of which it has been allowed to come in contact. Foul and disfiguring eruptions, infinitely worse than the true syphilitic, occasionally originate in this way. How often are we not called upon to witness the morbid effects of careless vaccination, performed with non-specific matter taken from unhealthy subjects? The records of experience, taken down by most practitioners, are fertile in such cases. The common

or constitutional irritation they were producing. He also had to remove several which John Hunter had before superintended the transplanting of in London, during the time when that operation was fashionable. Only one of Hunter's cases, out of several that went to him from this city, could succeed in retaining the tooth for any length of time. That one under Mr. Gardette's management was preserved many years. Two of Lemayeur's cases here, as Dr. E. B. Gardette now informs me, presented their forms of constitutional irritation in the shape of syphilitic eruptions, sore throats, or periosteal enlargements. Mr. Gardette attributed them to syphilitic inoculations, but such affections may have arisen from an absorption of the putrescent purulent matter from around the diseased fangs of the transplanted teeth. Wherever the periostea of the fangs, according to Mr. Gardette's statement, had been filed away to reduce the tooth to a proper size to fit its new socket, a foul caries would take place, and be followed with putrid secretions, although the undetached periosteal surface would sometimes adhere and maintain a vital connection with the alveolus. Hunter met with two such cases in London, after the teeth had been transplanted from unquestionably sound constitutions.

* I was once called into consultation at the same time, with Dr. S. G. Morton, Dr. Hewson, and several other physicians, upon the case of a lady suspected by her family to be affected with syphilis. She was covered with foul scabs and ulcers, and had a troublesome sore throat and pains in her shins and ulnas, with periosteal enlargements. On a most careful examination of the accused husband, a gentleman of high standing for morals and character, we found no sign of any existing or preceding venereal affection. After a full investigation of her case, we all pronounced it to be a genuine *ecthyma cachectica*, which, as she and her husband asserted, had followed a foul ulcer on the vertex of her scalp, from a contusion against the sharp corner of a cast iron stove. She did not like to sacrifice her full head of hair, and, therefore, allowed the purulent matter to concrete into large scabs, and to undergo putrefaction there for several weeks together, before the ulcer could be cured. In the meantime, absorption of the putrid matter (as Donné would say of the *vibrios* and *tricomenas*) took place, and infected her whole circulation with cachexia.

barbers sometimes inoculate their customers, also, by the morbid animal matters conveyed upon their filthy razors and brushes. Inoculation may readily fail, when ever so carefully performed with sharp lancets and bistouries; although the same virus may be successfully propagated, by ruder means, to surfaces more favorable to absorption.

The next secondary symptom in the usual order of occurrence, is the *ulceration of the throat*, when the tonsils in most instances are the seat of the disorder. The ulcers are not preceded or accompanied by much pain or swelling, although they soon produce a considerable excoriation of the tonsils. Hunter's description has been so long recognized by practitioners as a standard, that we will copy it verbatim. "It is a fair loss of substance; part being dug out, as it were, from the body of the tonsil, with a determined edge, and is commonly foul, with thick white matter adhering to it like a slough, which cannot be washed away." The similar deep excavations of the tonsils which sometimes occur in the phagedenic disease, can always be distinguished from it by their accompanying tenderness and soreness, as well as by the difference in their primary and other constitutional symptoms. The inflammation and swelling of the tonsils and soft arches of the palate, which follow the primary symptoms of the other forms of disease, as well as other sources of irritation, can also readily be distinguished from it by the chronic or general inflammation which prevails in the parts around and by the superficial or excoriated appearance of ulceration, which sometimes occurs there. As Mr. Carmichael stated, "any mercurial affection of the throat is recognized by the mercurial fetor of the breath which accompanies it. The use of this medicine may cause considerable inflammation and ulceration of any part of the fauces, particularly if the patient should expose himself to cold and wet when under its influence." Some venereal ulcers of the throat, however, are attended with a spontaneous salivation independent of all use of mercury; in the same manner that the irritation of small-pox pustules and cancerous ulceration about the mucous membrane of the throat and fauces, are attended with profuse discharges of viscid saliva. Mr. Carmichael states it as a singular fact, that when a patient afflicted with such venereal ulcers begins to undergo the action of mercury, the salivation diminishes, and, at length, entirely ceases, but is renewed again as

the mercurial process is farther advanced, first arising from the disease and afterwards from the remedy.

Within a few years past, the celebrated Ricord has attempted a great innovation upon the views of Hunter; indeed, we may say, of the whole profession, in regard to these secondary ulcers of the throat. He postpones the development of the dug-out or excavated ulcers of the tonsils to the third or tertiary stage of syphilis, and only classifies among the secondary symptoms the predecessor, or precursory appearance of this kind of ulcer. The true secondary affection of the throat which accompanies and often precedes the scaly eruptions on the skin, consists, according to him, in the formation of circular or crescentic patches of a thickened and bleached or pearly-looking epithelium. These pearly-looking crescentic patches are not necessarily connected with any evident degree of inflammation, and when it does occur, it is only erythematic around each of them. There is no pain or difficulty in swallowing, but occasionally a slight sensation of dryness or rigidity there. These may remain without ulceration for several weeks, unless they are exposed to the irritation of sudden changes of temperature or other injurious causes. They finally, however, become the seat of ulceration, at first superficial directly in the patches, and finally in the substance of the parts below them. If not timely relieved by local treatment or mercurials, they finally become converted into the foul tertiary ulcers, of the parts which have been generally regarded as the true secondary ones of the first order of parts, according to Hunter's classification of the symptoms. Since the first publication of Mr. Ricord's views upon this interesting subject, we have repeatedly met with this form of eruption in the mucous membrane, not only on the tonsils, but also on the tongue, roof of the mouth, and inside of the lips and cheeks. But it has never persisted any length of time. The application of lunar caustic or strong alum washes, accompanied by alterative doses, have always removed it in a few days, except in one case, and then the appearance only continued about three weeks, and was overcome without being followed by ulceration. On the other hand, more than three times as many cases have in the mean time occurred, during the same course of experience, where the white excavated ulcers of the tonsils, such as were described by Hunter, accompanied the development of the scaly eruptions, and were successfully treated simultaneously with them, by the same mercurial remedies. It may have happened

that pearly white and crescentic patches had preceded the ulcers in these cases, but the patients were never aware of their existence, and, of course, the practitioner had no opportunity afforded to him of making the examination. Indeed, the torpor and indolence of every form of the real or scaly syphilis are always remarkable. Every symptom, almost from its commencement, presents a chronic and non-inflammatory condition, which would appear, from our general experience with other similar forms of disease, to require the awakening action of mercury for its relief.*

The secondary symptoms in the second order of parts, after all the forms of contamination of the system from absorption of animal poisons, resemble the chronic states of rheumatism. The foul breath, the fetid eructations and the offensive perspiration of anatomists engaged in the laborious duties of the dissecting room, are very apt to be followed by the same form of disease. Patients who have recovered from the impregnation of septic poisons received in punctured or incised wounds on the fingers, also complain for months afterwards of similar difficulties.† It is not surprising, therefore, that true syphilis should be generally followed by nocturnal pains and swellings on the bones. The other forms of venereal poison, as we have said before, are more apt to affect the joints, the bursæ, the ligaments, and the fasciæ, in this stage of the constitutional disease. But after scaly syphilis, the shafts of the long bones, or the solid surfaces of those organs become, in general, the especial seats of irritation and enlargement.‡ Those nearest the surface, as the

* From some passages in his work, Hunter appears to have considered the internal integument of the pulmonary passages as liable, with the skin and throat, to syphilitic affections. "The lungs have been believed to have been affected with venereal disease, both from the circumstances preceding the complaint, and from the complaint itself being cured by mercury, and their being affected when the other viscera are not, may arise from there being, in some degree, an external surface, as will be explained hereafter." "If the venereal's cure attacks the lungs, although that disposition may be corrected, consumption may ensue; and in like manner, where the bones are affected, or the nose, scrofulous swellings or fistula lachrymalis may be the consequence, though the disease may have been cured."

† During the period of convalescence from scarlatina, and also from smallpox, it is a very common thing for patients to be afflicted with troublesome rheumatic pains. Sometimes the very same kind of chronic and irritative rheumatism of the joints and bursæ, that follows the papular and pustular venereal diseases, supervenes and continues obstinately for a long period of time.

‡ On reviewing the text, I find an omission of the period at which these se-

tibia, the ulna, the clavicles, and the cranium, are, in general, most liable to be affected. When the deeper parts are involved, the progress of the disease is always more gradual than in the superficial. The enlargements which sometimes occur under syphilitic influence in the tendons, fasciæ, and the testes, are usually indolent and free from pain, and bear a strong resemblance to scrofulous swellings. The true syphilitic node, as Carmichael asserted, is a solid enlargement of the bone itself, and is at first attended with very little pain or constitutional irritation. When the periosteum is affected, and especially when matter is confined beneath it, the

condary symptoms in the second order of parts usually break out. This is not so definite, however, as happens in the eruptions on the first order of parts. The influence of previous courses of mercury, exposure to cold or vicissitudes of temperature, irregularities in drink or diet, and miasmatic influence, all have a tendency to accelerate or retard the development of this class of venereal affections. Some have even contended that they are always the result of the combined effects of mercury and cold, instead of being the direct consequences of syphilitic poison. This, however, is an idle and childish supposition, as a general statement, for nodes and nocturnal pains are developed in constitutions where no mercury has ever been employed for the preceding symptoms, and after every care has been taken to preserve the general health. They sometimes break out before the development of the cutaneous eruptions and sore throat, and occasionally when no affection of the first order of parts is ever manifested. As a general proposition, it may be stated that they appear after an interval of from six to eight months from the occurrence of the primary chancre. Sometimes they are deferred until a much later period, so that many months have elapsed even after the effectual cure of all the affections in the first order of parts. I attended a gentleman, some ten years ago, who was affected with real nodes on his skull, both ulnas and tibias, complicated with excruciating nocturnal pains and colitis, or dysenteric diarrhœa. After he had become reduced to a pitiful state of emaciation, a general enlargement of the shafts of the right humerus and both femoral bones was detected; and finally one of the nodes on the frontal bone ulcerated under the detached pericranium. As soon as I had succeeded in checking the diarrhœa and discharges of blood and puriform mucus, scabs and copper-colored blotches, decidedly syphilitic, began to appear on his forehead, shoulders and legs. He was afterwards greatly benefited by an alterative course of sarsaparilla with iodine, in combination with corrosive sublimate; but the enlargements of the thigh bones and humerus never went down, although the nodes and eruptions disappeared. The diarrhœa never returned with any degree of severity after the breaking out of the scaly eruptions, although it had obstinately persisted for four months before. His idea was that the eruptions had been translated from the bowels to the skin by a metastasis. They certainly had never appeared till months after the nodes, and he declared not until seven years after his last preceding attack of chancre.

stimulus of distention causes excessive pain and disturbance. What are called the nocturnal pains then become excessively distressing, and require deep incisions to relieve them. Hunter says, "these pains are commonly periodical, or have their exacerbations, being commonly worse in the night. This is common to other aches or pains, especially of the rheumatic kind, which the venereal pains resemble very much." "When the pain is the first symptom, it affords no distinguishing mark of the disease; it is, therefore, often taken for the rheumatism." "The inflammation in these latter stages of the disease can hardly get beyond the adhesive, in which state it continues growing worse and worse, and when matter is formed it is not true pus, but only a slimy matter. This may arise, in some degree, from the nature of the parts, not being in themselves easily made to suppurate, and when they do suppurate, the same languidness still continues, insomuch that this matter is not capable of giving the extraneous stimulus so as to excite true suppuration or ulceration, even after the constitution is cleared of the original cause, and then the disease is probably scrofulous. Some nodes either in the tendons or bones, last for years before they form any matter at all, and, in this case, it is doubtful whether they are venereal or not, although commonly supposed to be so."

The above quoted sentences show very clearly that Hunter understood and fully anticipated all that succeeding writers have published concerning the anomalous sequelæ of syphilis. The disease of itself, especially when based on a scrofulous constitution, may easily degenerate into a cachectic habit, under the influence of which a great variety of consequent morbid symptoms will arise. This will invariably be the case when the natural progress of the disorder has been deranged or interfered with by irregular or badly managed courses of mercury. Whenever mercury acts as a poison instead of a curative agent, as it will do under a variety of circumstances, it modifies and often exasperates all the symptoms, so as to produce an indefinite protraction of some and a development of new forms in others. Such affections, however, do not occur after any distinct interval or period of time from the development of either of the former stages of secondary symptoms, as generally happens between the affections in the first and second order of parts; and Mr. Hunter, therefore, abandoned the idea, which he at one moment appears to have indulged, of classifying a group of symptoms under

the head of a *third order of parts.** Probably the same idea influenced Ricord, who has been complimented with the sobriquet of the French Hunter, by his English admirers, in constituting his class of tertiary symptoms of syphilis. In one respect, however, his arrangement is altogether more defective than Hunter's, for the general proposition which his pupils have all claimed for him as an original aphorism, is not universally or even figuratively correct. Mercury in all its forms is, according to that aphorism, injurious for the tertiary affections, while iodine comes in as the heroic and specific remedy for the whole class. But mercury is positively useful, nay, it is, when properly administered in combination with appropriate adjuvants and regimen, the remedy for all the regular and distinct symptoms of true syphilis in John Hunter's second order of parts. Iodine can only be substituted for it with advantage in the irregular or anomalous affections which, as we have seen, Hunter regarded as allied to scrofula in their nature, and which are certainly possessed of such cachectic traits as are always contraindicative of the use of mercurials. But even in this latter class of cases an alterative course of mercury will sometimes come in, after the close of all other treatment, as the effectual cure. Hunter understood this point fully, and speaks in several places of delaying or laying aside his antisyphilitic treatment, until, by palliatives and appropriate treatment, he had overcome the scrofulous and other complications, after the accomplishment of which intention, the action of mercury could be resumed with success. Carmichael is especially full in his details of such conditions, and, at present,

* "But it would appear that some parts of the body are much less susceptible of the lues venerea than others; and not only so, but many parts, so far as we know, are not susceptible of it at all. For we have not yet had every part of the body affected; we have not seen the brain affected, the heart, the stomach, liver, kidneys, nor other viscera; although such cases are described in authors. But as there are different orders of parts respecting the times of the disease appearing; and as the person commonly flies to relief upon the first or second appearances, it may be supposed that the whole disease in the parts actually affected, is cured before the other parts have had time to come into action, which will, therefore, be cured under the state of disposition only, if we can conceive that a cure can take place before parts have come into action. But if the parts visibly affected are cured, while those only disposed are not, and afterwards come into action, they would form a second order respecting time, and if these again are cured, and other parts under disposition should come into action, such would form a *third order of parts respecting time*," &c. p. 280.

there are very few well informed practitioners who are not aware of the importance of all these circumstances.

PRIMARY AFFECTIONS.

It is now the time to speak of primary affections, which are generally considered by medical students to be of greater importance than the most malignant fevers of the South. They are infinitely more common than the secondary forms of either of the varieties of the disease, and require the attention of practitioners in almost every part of the country. Not that these affections ever originate or prevail among the population of our rural districts, but because village merchants and other visitors to our large cities, sometimes carry home the fruits of their vices to demand the attention of even the most inexperienced of our profession. We have spoken of the primary symptoms last, not because they are least important, but on account of the greater facility with which the philosophy of their treatment can be communicated after a previous knowledge of the general conditions of the system towards the production of which they naturally tend. The first of this class is composed of such morbid discharges from the inflamed or excoriated mucous membrane of the genital organs, as are supposed to be productive of the papular form of constitutional disease in the classification of Carmichael. We have already given in our full adhesion to the doctrine established by the decisive experiments of Bell and Ricord, that this discharge constitutes altogether a different poison from the inoculable matter of a true chancre. But because no form of gonorrhœa uncomplicated with chancre has ever yet been successfully transferred by inoculation, except in the hands of Hunter,* it does

* It is generally supposed that Hunter repeatedly transferred the matter of gonorrhœa by inoculation, and produced chancres. He often inoculated successfully from chancres, taking the matter from the same and sometimes from other persons, but he never succeeded in producing a chancre from gonorrhœal matter except in one instance. "I ordered a person, at St. George's Hospital, to be inoculated with the matter taken from a well marked venereal ulcer on the tonsil, and also with matter from a gonorrhœa, which produced the same effect as in the preceding experiment, that is, the matter from a gonorrhœa produced a chancre, but that from the tonsil had no effect:" p. 268. The preceding case, however, was not a parallel one in regard to inoculation of gonorrheal matter. It was one of chancre, complicated with secondary sores on the

not follow that its contagious qualities have been in the slightest degree disproved. Other decisive infections and contagions are not inoculable, and we have as satisfactory reasons for determining that the contagious forms of gonorrhœa in every shape, can contaminate the system, as that the effluvia from measles and scarlatina can do it, without being of themselves actually inoculable. Ricord's assertions, that he never met with a case of constitutional disease resulting from gonorrhœa uncomplicated with chancre, are opposed by the disinterested testimony of hundreds of well informed practitioners in this country, who have been compelled to decide in favor of Mr. Carmichael.* Ricord's integrity is as unquestionable as is

skin. "The wounds inoculated with the matter from the chancres became chancres; but the others healed up." p. 268. Now had Mr. Hunter observed that the matter taken in the first experiment now mentioned by me, was taken from the same person who had the well marked venereal ulcer on the tonsil, Mr. Ricord would have good reason for asserting that this celebrated case was one of concealed chancre up the urethra, complicated with a purulent discharge. That, indeed, is the way in which he gets over the difficulty of all such cases of successful inoculation with gonorrheal poison, as have been reported. But Hunter's language rather tends to compel us to the conclusion that the gonorrheal matter was taken from another patient beside the one that had the venereal ulcer on the tonsil. His pupils, however, might easily have been mistaken in their selection of the case from which they took the gonorrheal matter, and a concealed chancre may have existed within the urethra, the matter of which was mixed with the gonorrheal discharge.

* While I am writing this very page of my manuscript, March, I have been called upon by two gentlemen whose cases are to the point. The first one, from Mount Holly, came this morning to consult me for a troublesome irritation in the throat, a rough and desquamating skin, especially about the scalp, neck, and shoulders, and rheumatic pains in his back and joints. I found his fauces, and pharynx, and palate, very red, vascular, and irritable, and the eruptions altogether papular, although fully desquamating in furfuraceous scabs. I asked him when he had been troubled with gonorrhœa, and he replied, that he had recently got over with a long case of full six months duration, by means chiefly of mild injections of sulphate of zinc. I made a careful examination of his urethra, and found nothing but a slight gleet remaining. There had been no reason to suspect a concealed chancre, nor was there present any sign of a cicatrix or stricture. The other case was that of a gentleman at the Union Hotel, just returned from St. Louis, where he contracted a severe gonorrhœa on the 1st of Nov. last. The discharge is still troublesome, but the present difficulty for which he now consults me, is a febrile condition attended with pains in his head, back, and loins, a mottled appearance and roughness of the skin, an herpetic inflammation attended with small pimples on the glands and prepuce, and a constant tickling and burning in the throat. I find the palate, and soft arches, and pharynx, very red, swollen, and dry, and they have probably remained so during the last three weeks without ulceration.

his high order of intelligence, but still he may have been mistaken in some matters of fact, especially in so mild a disease as the papular venereal. Patients, glad to have escaped from a filthy hospital and the restraints of disagreeable treatment, and perhaps, also, from the apprehended dangers of repeated inoculations, are not easily induced to go back for the relief of trifling symptoms, that never prevent them from attending to their ordinary avocations. But it is unnecessary to enter upon a minute examination of this point. It is certain that a large proportion of the cases of gonorrhœa are contagious, and that they reproduce themselves in other persons by contact of the discharge to almost any delicate mucous surface. Now this circumstance involves the necessity of supposing that the system as well as the part may be contaminated by absorption of the poison. It is impossible to separate, in our imagination, one form of contagion from all the others in a comparison of their essential characters. Something more, at least, than mere negative testimony must be afforded to us, before we can give up the conclusions derived from our own experience, and the positive authority of many of the best members of our fraternity.

By most writers, gonorrhœa has been divided into two kinds or species, simple and virulent. In order to understand the nature of their different positions, it is necessary to recollect that the mucous membranes are liable to be excited into increased or altered discharges under the action of a great variety of irritants. Common irritation, whether the result of local or constitutional causes, is usually followed by an exhalation of mucus or secretion of purulent matter, which relieves all inflammation and produces a speedy restoration to health. Thus, the introduction of a sound or bougie, especially when smeared with an irritating ointment, will soon be followed by a sense of heat and smarting pain, which is carried off in a few hours by an increased flow of thin mucus or a temporary secretion of pus. In the same manner, the irritating influence of acrid and neglected secretions of the female organs, or the local application of almost any offending material, may be relieved by a consequent excitement and discharge. The sympathetic irritation from worms and teething* in children, also affect the genito-urinary

* "I have known the urethra sympathize with the cutting of a tooth, producing all the symptoms of a gonorrhœa. And this happened several times in the same patient."—Hunter, p. 31. Several cases of simple gonorrhœa in children of both sexes, have occurred to me, in which I detected the cause of the irrita-

mucous membrane with the same symptoms, which speedily subside after a removal of the exciting cause. Gouty* and, John Hunter says, rheumatic irritation may terminate in the same way, and be as speedily relieved. All such cases of discharge from the mucous membrane of the urethra of the male, or the vulva of the female subject, are properly regarded as cases of simple gonorrhœa, and require but very little special treatment. All that is necessary to be done in general, after removal of the cause of irritation, is to insure rest, and cleanliness, and moderate abstinence for a short period, while attention is at the same time paid to the promotion of a watery and full secretion of unirritating urine. If this form of disease is ever kept up for a longer period than four or five days, it is always protracted by improper and injuriously irritating treatment. The use either of stimulating diuretics, or of astringent injections, will always be apt to check the relieving efforts at increased exhalation to the expense of a thickening of the membrane, and an increase of the irritation. This is the method, however, by which many cases, that would otherwise turn out to be those of simple gonorrhœa, are protracted to an almost indefinite period, and made to assume the characters of a more violent disease.

The irritations, however, which result from the impression of contagious virus on the same membrane do not so readily terminate under the mitigating effects of a discharge. The inflammation is

tion to proceed either from worms or some other kind of intestinal derangement. The friends of one little girl, nine years of age, once accused a respectable old man of deflouring her, because she was found to have a profuse discharge from the vagina. On a careful examination, I found the disease had proceeded from the sympathetic irritation of a great abundance of ascarides in the rectum. After destroying the worms by aloetic injections into the rectum, a few ablutions of sulphate of zinc in water, speedily overcame the discharge.

* About twelve years ago I sent a gentleman from this city to the care of my friend, the late Dr. Bushe, (of N. York,) to have him treated for an apparently severe attack of gonorrhœa, away from the suspicions of his family. He had not been under Dr. Bushe's care more than twenty-four hours, before he began to complain of a pain in one of his thumbs, and he immediately suspected the influence of gout. Indeed, it proved to be gout, and magnesia with colchicum speedily relieved him. This gentleman's father was an old gouty subject, and he himself has since evinced the most decisive characters of the disease, in the form of genuine podagra. Rheumatic pains are more apt to be the result of a gonorrhœa than the cause of it. They very frequently supervene upon protracted cases of gonorrhœa, especially when accompanied by the development of strictures, or the constitutional form of papular eruptions.

modified so far by a specific influence as to protract the morbid secretion, and accompanying irritability, for almost an indefinite period of time. Indeed, the most observing practitioners have repeatedly decided that the disease naturally tends to the development of a certain course or period, during the progress of which nothing can be done, except in the way of palliating or mitigating the symptoms. Hunter asserted that there was no specific, in his time, for the cure of this disease, and he often met with cases "where no known method would lessen the symptoms." He considered, therefore, in decisive cases of virulent gonorrhœa, that time alone would effect cures—the disease generally wearing itself out in the course of about six months.* The late Prof. Dorsey was in the habit of maintaining the same opinion, and Dr. Physick at that time believed that nothing but simple gonorrhœa could be cured by the action of remedies. Ricord attributes the inveteracy and constitutional effects of all such cases to the presence of a concealed chancre somewhere up the course of the male urethra, or the female vagina or uterus. But although such a condition sometimes proves to be the case, it is by no means generally so. The assertion of that great experimenter is altogether too positive upon this point, and has never been supported by the observation of the majority of our practitioners. Cases of virulent gonorrhœa do frequently occur, and prove very obstinate in their course and duration, independent of all association with chancres.† As we have before said, they

* "As we have no specific medicine for the gonorrhœa, it is fortunate that time alone will effect a cure; it is, therefore, very reasonable to suppose that every such inflammation ceases of itself; yet, although this appears to be nearly the truth, it is worthy of consideration whether medicine can be of any service in this form of the disease. I am inclined to believe it is very seldom of any kind of use, perhaps not one in ten cases; but even this would be of some consequence, if we could distinguish cases where it is of service, from those where it is not."—*Hunter*, page 64.

† One of the earliest of the pathological discoveries of Hunter was the fact that gonorrhœa might exist, independent of all ulceration. In connection with his celebrated brother, Dr. Wm. Hunter, he had preceded Sharp in his announcement that matter might be formed without a breach of substance. "So much being known, I was anxious to examine whether the matter in a gonorrhœa was formed in the same way. In the spring of 1753, there was an execution of eight men, two of whom I knew had at that time *very severe gonorrhœas*. Their bodies being procured for that particular purpose, we were very accurate in our examination, but found no ulceration. The two urethras appeared merely a little blood-shot, especially near the glands. This being another new

are, moreover, occasionally followed by a distinct and peculiar train of mild secondary symptoms, altogether different from the consequences of true chancre. The complication with chancres, whether externally situated or concealed, wholly outweighs the importance of all purulent discharge in the mind of every practitioner. The appropriate means of treatment in such cases will, however, be more easily considered under a separate head.

Before we undertake the treatment of any morbid discharge from the urethra, we ought, if possible, to decide whether it will prove likely to turn out to be a case of simple or of virulent gonorrhœa. Some of the measures which we are now in the habit of resorting to for the purpose of immediately overcoming the specific character of a virulent attack, may prove not only altogether unnecessary, but even positively injurious, for a simple irritation and discharge. In general, we may conclude that every case which breaks out imme-

fact ascertained, it could not escape Mr. Galaker, ever attentive to his emolument, who was then attending Dr. Hunter's lectures, and also practising dissection under me. He published soon after, in 1754, a treatise on this disease, and explained fully that the matter of a gonorrhœa did not arise from an ulcer, without mentioning how he had acquired this knowledge, and from that time successive writers have repeated the same doctrine. Since the period mentioned above, I have *constantly paid particular attention* to this circumstance, and have opened the urethras of many who, at the time of their death, had a gonorrhœa, yet have never found a sore in any; but always observed that the urethra near the glans was more blood-shot than usual, and that the lacunæ were often filled with matter. I have, indeed, seen an instance of a sore within the urethra, but this sore was not produced by any ulceration of the surface, but from an inflammation taking place probably in one of the glands, which produced an abscess in the part, and that abscess opened its way into the urethra. This very same sore opened its way through externally at the frænum, so that there was a new passage for the urine."

After this elaborate statement of Hunter, it appears to me a very idle undertaking to set up the few cases of *chancres larvees*, which have yet been detected in the male subject, in opposition to the doctrine of the possibility of a virulent gonorrhœa existing independently of a chancre. The two cases of executed criminals, above detailed by Hunter, must have been afflicted a long time with their "very severe gonorrhœas," for they could have only been inoculated before their first arrest and imprisonment. A considerable period always elapses before the trial and final execution, and their abstinence and rigid confinement in the cells of a prison would have overcome any case of simple gonorrhœa. As internal ulcers had always been previously suspected as the cause of urethral discharge, it must have proved impossible, moreover, for Hunter in his critical examination of these cases, to have overlooked the existence of any *chancres larvees*.

diately after, or within a few hours from the exposure, will prove to be a simple one, and require only a moderate course of antiphlogistic treatment, to effect a cure. Such cases will usually relieve themselves in a very few days, if nothing is done; whereas, all attempts at restraining the discharge by astringents, or counter-irritants, will be likely to check the natural efforts at relief, and produce a more exasperated and protracted inflammation. Whenever, on the other hand, there is a distinct period of incubation of from three days to several weeks* between the exposure and first appearance of symptoms, we may reasonably conclude that it is a virulent case, and will require some means of counteracting the specific and peculiar inflammation which generates the contagious matter. Although John Hunter occasionally indulged the idea that no remedies could absolutely cure this form of the disease, still, under the influence of his doctrine of the incompatibility of diseased actions, he often speaks of overcoming the specific inflammation by substituting a stronger one under the influence of counter-irritating remedies, which may afterwards subside of itself.† Indeed, this is the real foundation of the so called modern practice of ectrosis or abortion, which consists in abolishing the active stage of the acute disease by overwhelming impressions, applied either topically or

* Hunter says upon this point: "In the gonorrhœa, the times of appearance are very different. I have had reason to believe that in some cases the poison has taken effect in a few hours, while in others it has been six weeks; and I have had examples of it in all the intermediate periods; so far, however, as we can rely upon the veracity of our patients, and further evidence we cannot have, six, eight, ten, or twelve days would appear to be the most common period, though it is capable of affecting some people much sooner, and others much later." I have never seen a case that broke out the next morning after exposure, that did not prove to be a simple one. On the other hand, all those which have appeared after a long period of incubation, prove troublesome in my hands. I recollect one case which did not break out till full seven weeks. The patient was a respectable country merchant, and a bachelor, who could have had no object in concealing anything from me. He had gone home from the theatre, in New York, with a female, seven weeks before, and although he had occasionally felt some itching or smarting, the discharge never appeared till the day before he consulted me. It proved to be a very troublesome and protracted one, however, and was followed by an inflamed throat, papular eruptions, and rheumatic affections of his joints.

† "The only curative object is to destroy the disposition and specific mode of action in the solids of the parts, and as that is changed, the poisonous quality of the matter produced will also be destroyed. This effects the cure of the disease, but not always of the consequences."—*Hunter*, page 64.

through the medium of the constitution. In general, however, this result can only be accomplished before the occurrence of the stage of full suppuration.

The internal remedies of this class, which are now almost exclusively depended upon by practitioners, are copaiva and cubebs. Both of them act, when given in large doses, not only by making a decisive impression upon the mucous membrane of the primæ viæ, which is transmitted sympathetically to that of the urinary organs, so as to act upon its vital properties, but also, by impregnating the urine itself, and thus making an ultimate impression directly upon the diseased surfaces. Ricord offers another explanation to elucidate the immediate action of these remedies upon the acute stage of gonorrhœa, and this he imagines to be a revulsion from the affected membrane towards the stomach and bowels. When they act as purgatives, as they sometimes do, especially the balsam, they may produce some degree of revulsion, but it is questionable whether their beneficial effects are ever produced in this way. Certainly the preparations of colocynth, which are much depended upon by the sailors and prostitutes* of our seaports, are much better calculated for this particular purpose.

In every recent attack, which we have good reason for suspecting to be of the virulent form, it is the custom to resort at once to large doses of either the copavia or cubebs. Some practitioners always use them in a state of combination, and many add to them other diuretic and mucilaginous remedies. It is best, however, to follow the advice of Ricord in this matter, and keep one of these abortive medicaments, as he calls them, in reserve, to be used in case the other fails on a first trial. The copavia is usually administered, first in doses of from twenty to thirty drops every fourth hour. The French frequently give it in larger doses of from a drachm to one ounce, two or three times a day. It may thus be given pure with a little boiled milk or gum Arabic syrup. It is an excellent plan to administer it, like castor oil, poured into half a gill of foaming ale or

* Several of our apothecaries have informed me, that members of this class of people frequently call for the "bitter apple," the vulgar name for the fruit of the colocynth, which they buy in substance, and macerate with gin or whisky, before they take it for a domestic cure of gonorrhœa and fluor albus. It may have some especial influence, as the late Dr. Joseph Klapp used to think, over the pelvic viscera, for it is also used to restore the catamenia, and to procure abortions.

beer. The balsam floats on the fluid, and the foam covers the medicine from all contact with gustatory surfaces, during its passage into the stomach. Of late, this medicine has been made up by our druggists into capsules, and in that shape most patients can take it with perfect ease. Whenever it irritates the stomach, and provokes vomiting, notwithstanding all our care in attempting to cover its disagreeable taste and odor, it will fail in overcoming the symptoms, and must be laid aside as an abortive remedy. In case it purges merely, its revulsive effects will soon be lost; and if we want to continue it afterwards, for the purpose of deriving a sympathetic impression from it upon the genito-urinary mucous membrane, we must combine it with opiates and aromatics. Whenever it excites a cutaneous eruption, like urticaria or even simple erythema, it must be laid aside as positively injurious. Ricord thinks this effect is always the result of foul saburræ in the primæ viæ, which of course must always be expelled by ordinary cathartics. If it occurs in cold and damp weather, which he supposed to be also productive of the same effect, diaphoretic doses of nitre and antimony are the appropriate counter-agents. It is by no means necessary, however, to wait for the development of such affections, before we determine to suspend its use. In general we may say with perfect safety, that if balsam in these abortive doses does not speedily mitigate the symptoms of gonorrhœa, or at least overcome the discharge in four or five days, there will be no occasion for continuing it for a longer period. If no great exasperation of the symptoms or extension of the inflammation, beyond what Hunter called the specific distance,*

* Hunter's specific distance was meant to designate the true focus of gonorrhœal inflammation and discharge, which is healed at the fossa navicularis, and at most about one inch behind it. Whenever the inflammation extends beyond this region, so as to affect the prostate and lining membrane of the bladder or the testes, he continued it to become in these regions nothing but an extension of common inflammation by continuous sympathy. Other surgeons have regarded such cases of diffusion of the inflammation, as a species of internal erysipelas of the genito-urinary mucous membrane. It appears that Ricord, however, thinks it possible for the true gonorrhœal inflammation to become located higher up, and in more interior parts than the specific distance. He thinks that both the matter of gonorrhœa and the virus of chancre, may be formed as high up as the cavity of the uterus in the female and the prostate, and even the bladder in the male. It is certain that the mucous membrane in other parts can secrete gonorrhœal virus as well as chancrous, and we can experience no difficulty, therefore, in deciding that other portions of the urethra, besides the specific extent of Hunter, can become the seat of gonorrhœa.

have in the mean time occurred, it may then be proper to make trial of the cubebs in large doses for the same purpose. From two drachms to half an ounce of this remedy, given in dry powder, or mixed with sweetened water three times a day, will often, under such circumstances, put an immediate check to the discharge, and in a few days overcome the disease.

A number of other remedies of the same class have been used by some practitioners for the same purpose. Turpentine, Canada balsam, oil of naphtha, and the villainous compound of mineral tar and tincture of guaiacum, called Haarlem oil, have all been used in large doses in the early stage of gonorrhœa as abortive remedies. But they are decidedly inferior to the copaiva and the cubebs, and are liable to the same objections and uncertainties. It is only occasionally that any of this class of remedies will succeed. An increase of the local inflammation is very apt to occur, and not unfrequently an extension of it far beyond the specific distance in the urethra will follow. Now every kind of treatment must necessarily prove injurious that merely checks the discharge, without at the same time relieving the inflammation. It is a law of the parts that an unchecked inflammation, if not permitted to relieve itself by an increased discharge, will go on to a thickening of texture or a morbid exhaustion of the coagulating lymph on the free surfaces of the lining membrane.

After a full trial of such internal ectrotic or abortive remedies has failed, it is the customary plan to depend on a general treatment of the antiphlogistic kind, and to resort at once to the use of injections. Mucilaginous and opiate injections are used first to allay the irritation, and afterwards mild astringents of acetate of lead or sulphate of zinc, to restrain the discharge. After these remedies have been employed for a few days, generally with only the effect of mitigating the symptoms, the balsam or cubebs are again resorted to in smaller and simply diuretic doses. They are then generally combined with diluents and other diuretics, in order to direct their action especially upon the urinary organs. That they may influence the action of the urine upon the diseased surface with which it comes in contact, is evident from the odor and other sensible qualities with which they affect that fluid; and also from the fact, which is corroborated by the authority of Ricord, that the beneficial influence of these remedies is wholly confined to the urethras of the two sexes. For gonorrhœal discharges from the

eyes, the nostrils, mouth, anus, and vagina of the female, nothing can be effected by the use of balsam or cubebs. If this treatment happens fortunately to relieve an ordinary case of gonorrhœa, the proper plan is to continue it for two or three weeks after the disappearance of all discharge, gradually diminishing the amount and the frequency of repetition of the doses. But, unfortunately, notwithstanding the universal popularity of this method, it does not fully succeed in a majority of cases. Many patients are wholly unable to tolerate it, in consequence of the supervention of gastralgia or even gastritis, from the irritating effects of the remedies upon the coats of the stomach. Even the cubebs, although an aromatic and stomachic, in small doses, often becomes excessively irritating to the stomach and the system. It has sometimes driven out almost as troublesome and disfiguring eruptions as result from the use of the balsam. In the same manner it then proves injurious to the disease as well as to the constitution, and must be immediately laid aside. Under such circumstances the use of diluent or mucilaginous drinks, and alterative or astringent injections, becomes the only plan of treatment upon which we can depend. From the time of Hunter until a very late period, such articles as a weak solution of corrosive sublimate, of the sulphates of copper, zinc, or iron, or alumina and potass, have chiefly been employed, and their use has frequently overcome the remains of the disease after the failure of all internal treatment. But the nitrate of silver thrown up in a weak solution, by means of a glass syringe, has now almost entirely superseded these old favorites of the profession. We begin with half a grain dissolved in an ounce of pure water, and increase the strength from day to day, until finally we often throw up from four to six grains in an ounce, three times a day. This local remedy acts as much like an antiphlogistic as an alterative, and when properly managed, is destitute of all irritating qualities. It never tends to the production of strictures or any other organic disease, provided proper care be taken to aid its sedative influence by appropriate regimen and constitutional treatment. If mild laxatives, diaphoretics and occasional tepid bathing and farinaceous food be persisted in, the remedy may be successfully used, even in cases of an erysipelatous or diffused inflammation of the organs which have extended far beyond the specific distance. Its action upon the irritable solids is very different from any of the counter-irritants or astringents. It corrects the purulent discharge and finally over-

comes it, at the same time that it allays the irritation and vascular excitement. If any suspicion of a spasmodic contraction or stricture is entertained by the practitioner under these circumstances, it will be best to apply the same remedy upon a medium sized bougie, and convey it up the whole way into the bladder. This can easily be done by smearing the polished instrument with a mucilaginous solution or a finely prepared cerate of the lunar caustic, at each introduction up the urethra. This operation, on being repeated once every second or third day, while the injections are continued during the intervals, as before recommended, will speedily overcome every vestige of the disease in most cases, no matter how inveterate they may have been.*

* As many practitioners will desire the exact particulars of treatment laid down by so careful a writer as Acton, I will transcribe his directions for the two kinds of treatment for gonorrhœa described by him. "*The abortive treatment.* At the commencement of a discharge from the urethra, and previous to any redness around the orifice, or pain felt in making water, the surgeon will frequently be able at once to cut short the affection and cure his patient; under other circumstances this plan will not avail. It consists, in addition to the general means spoken of under the head of abortive treatment of blenorrhagia," (rest, low diet, &c.,) "in employing, during the succeeding forty-eight hours, twelve injections of nitrate of silver at regular intervals: the strength of the solution of the salt should be two grains to the ℥viij of distilled water. Let the injections be then left off, and cubebs or copaiba be given in the doses above spoken of." (From ʒj to ℥j of copaiba, and ʒj to ℥ij of the cubebs, in the twenty-four hours.) "If the case be recent, and the disease not too far advanced, this treatment will succeed fifty times in a hundred cases in checking the disease, and there is no fear of occasioning stricture or swelled testicle at this period of the complaint. Under this treatment the running will at once cease; but to complete the cure, it will be necessary to continue the cubebs, diminishing gradually the dose. No further recourse should be had to the injections, as a continuance in their use would only tend to keep up irritation. At the end of fifteen days the surgeon may allow his patient to resume his usual habits."

"The *direct treatment* consists in the employment of injections. Of all those I have seen employed, no doubt exists in my mind that by far the greatest benefit is derived from the use of the nitrate of silver. The strength of the solution should be two grs. to ℥viij of distilled water. To employ this properly, the following directions should be attended to: During the forty-eight successive hours twelve injections should be thus used:"—here follow precise directions how to hold the glass syringe, how to sit, how to push the piston, &c. &c. "The liquid should be injected cold, and a common sized syringe only half filled will be sufficient, as the urethra does not hold more than that quantity. Soon after the injections have been employed, there will be a reddish-looking discharge. This should not prevent the patient from continuing the injections at intervals of four hours, notwithstanding any slight pain which may occur. A slightly

Ever since the doctrines of Ricord have been made known here, by the return of his American pupils from Paris, a great revolution has been made in our treatment of virulent gonorrhœa. In the very commencement of the disease, even in its most active form, we begin the treatment by the introduction of the solid lunar caustic by means of Lallemand's *porte caustique*, carried up beyond the specific distance, and twirled around as it is gradually withdrawn, so as to brush, or smear it over the whole inflamed surface. This being occasionally repeated, and followed by mucilaginous or perhaps by weak caustic injections for a short length of time, will frequently effect a prompt cure on the principle of Ricord's abortive influence, and render it unnecessary to resort to any internal treatment. This plan was first resorted to for the removal of his *chancres larvées*, but was finally found to be as successful in the relief of an uncomplicated gonorrhœa.

In females the disease is more complicated on account of the extent and diversity of parts which are liable to it. Since the careful investigations of Ricord into this subject, by the aid of the *speculum uteri*, much additional information has been supplied to us upon points, in regard to which we had before been inattentive, if not ignorant. He not only demonstrated the possibility of a coexistence of chancres on the os uteri, or within the cervix, as well as high up the vagina, with a gonorrhœa of the inferior parts, but also, the different locations of the specific inflammation itself, in different parts of the genito-urinary mucous membrane. Several practitioners in this city have taken great pains to follow up his researches into these matters, and have verified his observations in every particular.

purulent discharge is a very favorable sign, as it shows the disease will rapidly yield." Mr. Carmichael "advised that injections of nitrate of silver containing ten grains to the ounce of water, should be used. He purposely caused an inflammation to destroy the special catarrhal one, and stated that gonorrhœa might be cured by this means. He further treated the inflammation of the urethra, which he had occasioned, by antiphlogistic means, and on the disappearance of the inflammation, he stated that both complaints were cured." Ricord thinks this severe practice is "like playing a game of doubles or quits: if the disease be not cured, its violence is increased in a relative proportion," &c. Many experienced practitioners, however, extol Mr. Carmichael's practice, and some have injected much stronger solutions of the caustic once or twice in the beginning of the disease. Mr. Arnott, in a late number of the London Lancet, asserts that a solution of twelve grains to the ounce injected only once up just above the specific distance, and held there for half a minute, will whiten the whole surface and prove a complete ectrotic.

Excoriations and granulations have been found on the os tincæ in connection with profuse gonorrhœal discharges from the vagina and the urethra, and occasional, though not frequent complications with chancre on the same part. As the stimulating and abortive diuretics can do no good, except for the affections of the urethra, it necessarily follows, that injections up the vagina are very necessary for the gonorrhœas in females. Much stronger solutions, however, may be employed than in the male, on account of the greater diameter of the tube, lined by the diseased mucous membrane, and the freedom from all danger of strangury or retention of urine. The solid nitrate of silver carried up through the whole extent of the vagina, and even into the os tincæ itself, becomes especially efficient in all severe cases. If chancres are suspected in any case, their existence and precise situation should be demonstrated by the use of a speculum, and a thorough cauterization of them be effected by the solid stick of caustic. The *speculum fenestratum*, or the wire speculum invented by Dr. Dix, of Boston, becomes a very useful instrument in inspecting ulcers of the walls of the vagina and enables us to treat them with the greatest possible advantage.

When the vaginal discharge is complicated with an excretion from the cavity of the uterus, it will sometimes become necessary to throw up weak injections of nitrate of silver, or sulphate of zinc, or creasote through the os tincæ. Great care, however, should be taken not to use too much force, nor to fill up the cervix too tightly with the tube of the syringe. It is possible to over-excite the irritable interior surface of the uterus, and perhaps, even to force the injection through the Fallopian tubes into the cavity of the peritoneum.*

* I once got discouraged with all the ordinary measures of treatment for a case of troublesome uterine discharge, in the case of a lady from Erie, on the lakes. I therefore brought the os tincæ into view, by the use of the bivalve speculum, and carried an ivory pipe of a strong gill syringe, fairly up into the cervix. Through it I injected a solution of six grains of sulphate of zinc, to the ounce of rose water. The lady shrieked out with pain, fell into hysterical spasms, which were followed by chills and fever, and finally by a severe peritonitis. It required several blood-lettings, leechings, and mercurial laxatives before I could relieve her. She ultimately got well of her peritonitis, and of the uterine discharge. I tried afterwards, however, the vinous tincture of ergot on the principle alluded to by Ricord. "In like manner the ergot of rye appears to me in the few cases in which it has been of service, only to influence *uterine* blennorrhœa, and to be inert in cases where the vagina and vulva were affected." I have since repeatedly used injections of six grains of nitrate of silver to the ounce of water into the cavity of the uterus, according to Ricord's recommenda-

If the discharge is complicated with caruncles or warty vegetations, under the symphysis pubis, or within the urethra, they should first be excised, and afterwards thoroughly burnt away with pure caustic.

Abscesses are very apt to form in the labiæ after severe cases of inflammatory gonorrhœa, and they should always be timely evacuated by a free incision. Hunter attributed them to obstructed ducts of the muciparous follicles of the vagina. Ricord made the observation, which we have repeatedly verified, that they always present a very offensive fœcal odor, although they never maintain any connection with the rectum.

Buboes in both sexes, resulting from gonorrhœa in every form, excepting those cases alone which are complicated with chancres, have been proved, by the experiments of Ricord, to be sympathetic. Even when a hard cord can be traced along the lymphatics, from the affected parts to the nearest ganglion, the swelling of that ganglion is the result of a continuous propagation of the inflammation, which induced John Hunter to call it a sympathetic bubo. Buboes from absorption of gonorrhœal matter in short, are believed, by Ricord and his school, never to occur. At least, the matter taken from them after their suppuration, has been proved by multiplied experiments never to be inoculable. Hence it follows, that they are to be treated as common inflammatory swellings from any other cause. But they are liable to the same difficulties of treatment as occur in all enlargements of the lymphatic ganglia after excoriation of the toes or instep in irritable constitutions. The treatment is often more protracted and unsuccessful than in the genuine buboes, from absorption of the morbid poison of true chancre. In general leeches, blisters, emollient poultices with lead water, and laxatives will speedily relieve the inflammation in healthy constitutions. If a

tion, with excellent success. But I have taken especial pains to use a small glass syringe, and to throw it up with a very light force. For the treatment of chronic discharges from the uterus, however, by no means invariably requires the use of the speculum, or injections into its cavity. I have often succeeded by conveying a quill or slender forceps, armed with a solid piece of caustic, up to the os tincæ, beside the left index finger, applied to it by the touch. By the same means chronic inflammations, and enlargements of the whole cervix, can be effectually relieved after a few repeated applications. I have cured bleeding fissures and ulcers on the os tincæ in the same way. Ricord asserts that menstruation can be promoted in obstinate cases of suppression by the same measures.

tendency to chronic induration be observed, the application of the ointment or tincture of iodine will be proper; blackening the cuticle over the swelling with lunar caustic, will also frequently prove of great service. In general it will be improper to resort to severe purgatives, but we should reproduce the discharge from the urethra. Tepid baths, or the vapor bath, will often contribute greatly to the relief of such cases. If, in spite of all our efforts, suppuration occurs, it is best to make timely incisions to prevent extensive undermining of the skin and insulation of the ganglia. The matter generally collects around and not within the substance of the ganglion, and constitutes a periadenic abscess. If the skin over such collections has been extensively undermined, it will often become necessary to destroy it with caustic potass, or to pare it away with the curved scissors. Poultices will then bring out a plentiful crop of granulations which will contract, and speedily close the surface. We have already given full directions for the management of scrofulous buboes, under the head of abscesses in strumous constitutions.

During the acute stage of severe gonorrhœas, chordee often becomes a troublesome complication. When this symptom is connected with violent inflammation, the abortive treatment must be temporarily at least laid aside, and active depletion resorted to. General blood-letting, mercurial cathartics, followed by antimonials and diluents, and leeching on the perineum, will soon subdue the inflammation, after which full doses of camphor and opium, at bed-time, will generally prevent the nocturnal erections, or spasmodic chordee. Camphor and opium may also be injected into the rectum, in combination with cold mucilages, at bed-time, with great advantage, in the same manner as they are used for correcting nocturnal emissions. The hemorrhages which occasionally follow spasmodic erections, during the active stage of gonorrhœa, tend to relief, and if not too severe, are favorable. When excessive, they should be restrained by external cold, and the internal pressure of a large catheter. When the chordees become permanent, from the effusion of organized lymph into the walls of the urethra, or into the corpora cavernosa, mercurials will frequently become necessary to create a reabsorption of the effused plasma. The daily introduction of a large bougie, smeared with mercurial ointment, and occasionally with lunar caustic ointment, will aid very much in facilitating the cure, and so will mercurial or iodine plasters spread on kid-skin, and wrapped around the whole organ.

Whenever strangury occurs in connection with gonorrhœa, the surgeon of course suspects the existence of inflammation about the neck of the bladder, and resorts to blood-letting, hip baths, calomel, leeches to the perineum, and anodyne enemata. But the condition of the prostatic and ante-prostatic glands should never be overlooked under such circumstances. Not unfrequently the cause of the difficulty in micturition and the tenesmus, will be owing to an enlargement of one or all of these glands which is proceeding to suppuration. If, in despite of general and topical depletion, a fluctuation commences in either of these structures, a timely incision should be made to evacuate the matter, either through the perineum, or at the verge of the rectum. On examining the tumefaction by means of one index, *in ano*, and the adjacent thumb upon the perineum, while the other hand holds a catheter in the urethra, we can always detect the precise situation of the small abscess with great care, and afterwards make the requisite puncture. An early incision will, in general, prevent all communication with the urethra, but even when the operation is delayed, until the abscess breaks into that passage, an external incision should be made, to obviate the dangers of urinary infiltration. A full-sized catheter will then have to be worn by the patient, until the fistulous opening through the incision is completely healed. Sometimes the small lacunæ and follicles of the urethra become obstructed by the inflammation of gonorrhœa, and form knots or tubercles along the course of the urethra. These occasionally suppurate, especially just behind the glans, and should be treated in the same way as we have recommended in the case of Cowper's glands. Some practitioners are very ready to mistake these follicular enlargements for internal chancres, but they are vastly more common in that situation than the *chancre larvẽ* of Ricord.

The next complication of gonorrhœa in order of occurrence, is a swelling of the testicle, usually on the left side, but which sometimes, however, occupies both organs alternately. From the now obsolete idea that this accident always proceeded from a translation of the gonorrhœa, or defluxion of the humors upon the testicle, it was formerly called the hernia humoralis. Ever since the prevalence of sounder opinions in regard to the propagation of the inflammation, either by direct sympathy, or a continuous extension along the course of the urethra and vas deferens to the epididymis, the affection has been termed orchitis, or epididymitis, according as

the substance of the organ itself, or its posterior appendage, is the seat of the enlargement. Although the body of the testis is sometimes eventually affected, still, in the majority of cases, the inflammation begins in the vas deferens and epididymis, and only extends to the tunica vaginalis. An early effusion of lymph, or bloody serum, generally takes place into the cavity of the tunica vaginalis, and counterfeits the appearance of an enlargement of the substance of the organ. A timely puncture with the lancet will decide this point, and completely relieve the tension and agony in many severe cases. Active depletion, however, followed by mercurial cathartics, antimonials and copious leeching over the scrotum, will speedily check the disease, and prevent such an aggravation. The recumbent posture and elevation of the organ upon a pillow, which at the same time supports an enveloping poultice with lead water, should always be directed, until the inflammation is overcome. Afterwards a suspensory bag should be worn for several weeks. The epididymis generally remains in an enlarged and indurated condition for a long period after such an attack, but under the use of laxatives, and the application of a mercurial plaster, it finally subsides, and leaves the organ free from all functional embarrassment. If any disposition to stricture in the urethra, however, coexists, it should always be overcome by the occasional introduction of a bougie smeared with lunar caustic ointment. Sympathetic irritation in the urethra always reacts injuriously upon a diseased testicle, and if neglected, frequently induces the formation of a hydrocele, or of some other organic disease of the member.

Sometimes an irritable state or chronic inflammation of the urethra follows impure connection, which never terminates in a discharge, but continues in the form of an erythema for a long period of time. This has been called a dry gonorrhœa by practitioners, and frequently causes great anxiety and distress in the mind of the patient. The introduction of a bougie smeared with mercurial ointment, will sometimes overcome this condition by exciting a discharge, which relieves the inflammation in the natural way. But, in general, a light application of lunar caustic will most effectually remove the irritability, and restore the parts to a healthy condition. The irritable urethra which accompanies a derangement of the general health, from sedentary habits, onanism, &c., should be treated by the same means, in addition to proper constitutional regimen and exercise. The external discharges from the surface of the glans

and interior of the prepuce, called gonorrhœa præputialis, or balanitis, by different authors, are easily relieved by frequent ablutions of a solution of sulphate of zinc, or chloride of soda, or nitrate of silver. In case these fail, a sure remedy consists in the steady use of dry lint or fine linen rag, interposed between the prepuce and the glans.

Simple excoriations, and eczemas, and herpetic eruptions on the glans and prepuce, are to be treated in the same manner. They never should be confounded with the effects of specific poisons, although it may frequently be necessary to pay some attention to the state of the constitution in which they occur. Stimulating drinks and food should always be prohibited, and in case of an evident constitutional liability to herpetic diseases, the internal use of alteratives, especially the arseniate of potass, should be recommended.

Discharges from the irritation of mucous tubercles at the umbilicus, perineum, folds of the scrotum, inside of the thighs, groin, and axilla, have been mistaken for gonorrheal contaminations by some practitioners. They can easily be cured by cleanliness, mild styptics, the use of interposed pieces of fine linen or lint, and an occasional sprinkling of finely powdered calomel over the excrescence. Ricord's favorite remedy is washing with a strong solution of common table salt, twice a day, before dusting on the calomel.

Suppurations from the mucous membranes of the ears, mouth, nostrils, and throat, have been occasionally suspected to be of gonorrheal origin, but Ricord denies that he has ever had any reason to form such a conclusion. They are probably always the result of catarrhal, or scrofulous, or cachectic influences, and are to be cured on the same general principles that govern us in the management of those diseases in other parts of the system. From the anus, however, Ricord and other experienced observers admit that true gonorrheal discharges do sometimes escape, in consequence of a direct contamination of the mucous membrane of the rectum. The light application of lunar caustic in substance, so as to whiten the whole of the affected surface under exposure, by a wire speculum, is by far the most prompt and effectual measure of cure. The frequent use of emollient and cooling enemata, and the confinement to laxative and farinaceous diet, are at the same time necessary to relieve the rectum from the irritation of costiveness and of mucous secretions. Fortunately, no other form of this species of disease ever

occur in this country, than results from the accidental trickling down of the contagious matter from the genito-urinary to the rectal mucous membrane in the female. No such horrible and unnatural crime as that which has been suggested in France for its communication, ever occurs here. With all our political sins upon our heads, the most profligate of our people have never been liable to any charge of such brutality and baseness.

By far the most deplorable and distressing form of gonorrhœa, is that which occurs from a direct application of the virus to the eyes. The old opinion in regard to the repulsion or metastasis of the discharge from the urethra to the eyes, has, fortunately, now become obsolete; and all practitioners caution their patients against imprudent handling of the matter, or exposing it in such situations as may by any possibility serve to convey it to susceptible portions of the mucous membranes. The eyes of other persons as well as those of the sufferer himself may easily be contaminated by the smallest particle of the real virus. No inconsiderable number of patients in this city have been deprived of an eye, and a few have lost both organs from accidental exposure to this influence. The grade of inflammation which accompanies gonorrheal ophthalmia is usually much higher and more protracted than that which arises from any other cause. Depletion and internal antiphlogistics alone, will not cure, notwithstanding their beneficial influence in mitigating the violence of the disease. The lids will swell enormously, the conjunctiva of the ball tumefies into a frightful chemosis, the lining of the tarsi becomes granular, and the cornea more or less cloudy, in spite of the most active general treatment. Of course, no time should be lost in instituting severe antiphlogistic measures, but the great remedy consists in everting the palpebræ, and smearing the solid lunar caustic over the whole affected surface, so as to whiten it as early as possible after the commencement of the disease. Mild and soothing mucilages, such as the infusion of quince seeds, of flaxseed, or the pith of sassafras, should be frequently after insinuated beneath the lids, to allay the sense of smarting and roughness, and also an occasional use of a weak solution of the lunar caustic to excite contraction of the capillaries. The moment the cornea begins to appear cloudy or mottled, fears should be indulged of the inflammation extending to the iris, for then the deep seated or ciliary arteries begin to partake of the diseased action. The extract of belladonna or stramonium dissolved in water, should at that period

be immediately applied over the lids, and occasionally dropped upon the ball to paralyze the circular fibres of the iris and prevent a closure of the pupil. Mercurials should also then be resorted to, and pushed to a slight salivation, not for the idle purpose of neutralizing the virus, but to arrest the deposition of lymph on the anterior capsule and in the substance of the iris and cornea. If any considerable opacity has already resulted from such deposition, or in case any quantity of matter has been formed in the anterior chamber, in the shape of a hypopon, we may still hope to disperse such depositions by the prompt action of the mercury, aided by a continuance or even increase of the general depletion. In some desperate cases, however, it will be necessary to puncture the cornea to evacuate the pus and relieve the excessive and painful distention of the globe. If the chemosis of the conjunctiva which covers the sclerotica, becomes very full and prominent, free incisions must be made through it in radiating lines from the verge of the cornea, through the whole mass. This will let out the serous or gelatinous sub-mucous affusion, and speedily cause a shrivelling or subsidence of the chemosis. In some cases the tumefied conjunctiva becomes very thick and fleshy, so as to puff out the lids very greatly, and even to project between and before them. It will then be necessary to excise large portions of it with the curved scissors. Whenever the granulations on the inner surface of the tarsi become large and warty, so as to resist the action of the caustic, they should be pared away with the knife, or excised by the curved scissors. It sometimes happens after the disease becomes chronic, that the portion of the membrane lying in the palpebral sinuses, both above and below, becomes very thick, fleshy, and studded with warts. This must always be raised with the forceps and cut thoroughly away by the scissors. After repeated touching or brushing over these surfaces with the solid caustic, with intervals of four or five days apart, the excessive irritability of the parts will in general become so far relieved, as to allow of the application of a strong solution of alum or sulphate of copper. These articles are more powerful than the caustic in restraining the disposition to a reproduction of the granulations and warts, and also check the puriform secretion more effectually. The lunar caustic, however, should first be repeatedly used to overcome the specific actions, and to remove the excessive irritability.

When new-born infants are attacked with this disease, in consequence of contact with the vaginal secretions of an infected mother,

both eyes are generally simultaneously affected. As general depletion can then hardly be thought of, we must depend almost wholly on topical applications. In addition to the repeated use of the lunar caustic, the eyes should be frequently syringed out under the lids with a weak solution of chloride of soda, or corrosive sublimate, and the same remedy should be constantly worn over the lids by a moistened compress. Before the introduction of this plan of treatment into general practice, the disease used to be so rapid in its progress as frequently to destroy both eyes in thirty-six or forty-eight hours. When it was confined to one eye in adults it usually required four or five days to place the functions of the organs out of the reach of remedies. Now, however, we certainly succeed in the majority of cases, both of infancy and adult age, in preventing the loss of vision, although we occasionally meet with cases in which it is impossible to prevent some degree of impairment of the special sense.

When the eyes become successively affected with this disease one after the other, the occurrence does not happen from metastasis or sympathy, but from actual transfer of the virus. Great care, therefore, should always be taken to protect the other eye, while we are treating an affected one. The patient should be made steadily to hold his head, so as to prevent the force of gravity from conveying the matter to the other side. A high bridged nose is found to be a great protection in this respect; but every other defence that can be artificially supplied should be resorted to. Nothing, of course, need be said by us concerning the importance of confining the use of the towel and wash-basin, or other domestic implements, to the patient himself under such circumstances. It is fortunate enough, however, that we can so soon check the specific action and consequent contagious qualities of the discharge by the use of lunar caustic, otherwise the disease would be much more likely to extend through whole families, than we at present find to be the case.

Primary Ulcers.

Although excoriations, fissures, ulcers, and especially wounds of every description, always favor the absorption of morbid matter into the system, still it is by no means necessary that venereal poisons should be brought into contact with raw surfaces in order to make their specific impressions. The tender and irritable mucous surfaces of the genital organs easily take on the actions from every

form of virus which develope these specific diseases. We therefore not only watch every suspicious appearance on a scratch, or excoriation after impure connections, but we especially attend also to the first development of the smallest pimple or pustule on the glans, and other delicate surfaces of all the parts exposed to the different contagions. Since the introduction of the present improved mode of treatment, which consists in immediately destroying every suspicious symptom of this kind by the prompt action of solid caustic, and healing up the surface under dry lint accompanied by rest and cleanliness, we have but very few opportunities of witnessing any further development of the diseased actions. Formerly we applied mild and unmedicated dressings, and watched the natural progress of all cases for a few days, until we had an opportunity of deciding whether the sores were healthy or likely to turn out to be of any specific character. We now decide that the interest and safety of our patient are of more consequence than the gratification of our curiosity, and we therefore, immediately convert all cases into simple sores, and heal them up as speedily as possible, without allowing them either to assume specific aspects, or to contaminate the system. The plan adopted by Ricord under the same circumstances, of applying lint wet with aromatic wine, after a full cauterization* with the nitrate of silver, is no doubt a successful one; but a diluted tincture of bark, of myrrh, of gentian, of catechu, or any other astringent, is just as successful. Ricord recommends also, the solution of tannin in wine; but many surgeons prefer common lau-

* My friend, Dr. King, of the U. S. Army, informs me that the common practice at present among his colleagues of the medical staff, is to fill the cavity of all pimples and ulcers when they first appear, with finely levigated calomel and cover it with a dossil of dry lint. This dressing is reapplied as often as it becomes moistened with the purulent secretions, until cicatrization takes place; after which nothing more is ever heard of the case. In the navy it was once the practice to touch every sore with a drop or two of a solution of the sulphate of copper, ten grains to the ounce, and then apply the dry lint, repeating the dressing but once a day till the cure was effected. Ricord cauterizes even the smallest pustules repeatedly, until the surface exposed after the last detachment of the eschar presents a suppurating and granulating aspect, and takes care to keep the lint constantly moistened with his aromatic wine, to prevent irritation on every change of dressing. In most cases, however, when the caustic is thoroughly applied, even into the cavity of the mucous follicles, which we suspect to be giving origin to infollicular chancres, a single application will suffice if we keep the parts at rest for a few days, and moisten the protective lint occasionally with any mild astringent.

danum. The real improvement over the old dressings, consists in substituting a neat and drying application in place of the foul and irritating ointments, or the cerates, which become irritating from speedy rancidity, and thereby favor suppuration and ulceration. The lint attracts the matter away from the sore, and keeps the surface constantly clean, while the astringent wash gives tone to the parts, and prevents absorption. The only kind of primary ulcers which cannot be cured in this way, during the first few days of their progress, are the sloughing blue tubercles, and phagedenic sores of the tubercular syphilis. They, as we have stated before, require a stronger escharotic of pure nitric acid or potassa fusa, to be thoroughly eradicated.

Unfortunately, however, for their safety, some patients do not come to us until after the primary sores have made considerable progress, and assumed such morbid characters as may have not only contaminated the surrounding parts, but also afforded a new supply of virus, sufficient to gain admission into the circulation. It is very doubtful whether we can assign the precise time when the specific character of any sore has progressed so far as to contaminate the system. Ricord asserts that he has proved that the true syphilitic chancre cannot do it until after the fifth day from its first commencement.* The opinions of most intelligent surgeons of this day correspond with his in regard to this point, as well as to all other primary sores besides chancres. Every one hopes to prevent constitutional symptoms, even in the sloughing phagedena, by promptly arresting the local disease. But experienced observers are not wanting to attest the fact that in some rare instances the system has become diseased, after a very short existence of the primary affection. Many, indeed, still believe that the existence of no primary symptom is absolutely necessary to the contamination

* "However, in order to judge properly of the treatment required by chancre, we must consider it under its various forms, in its regular or irregular state, and with or without complication. Whatever form a chancre may assume in its commencement, it ought to be treated by the abortive method; for there is no authenticated instance of ulcer destroyed within the first five days after infection, having afterwards given rise to secondary symptoms, if those ulcers existed alone and without other complications. If, however, it be acknowledged that chancres ought to be destroyed as quickly as possible, it is equally clear that the same means will not be proper in every case, and the indication for those which have been proposed, as excision, direct and mediate cauterization, deserves a moment's consideration."—*Ricord, translated by Doane,* page 221.

of the system from direct absorption. Cases of decisive constitutional disease certainly have been witnessed, before which the patients were never conscious of any form of primary affection, and during the treatment of which, the attending physicians could never detect any scar or other trace of the appropriate preceding disease. Notwithstanding the uncertainty of opinion upon this one point, however, all are agreed upon the importance of curing the primary ulcers, in whatever stage we find them, as speedily as possible. Every day's delay increases the danger of constitutional infection: and in direct proportion to the rapidity of our success, will be the diminution of the extent of absorption. But after the ulceration has been allowed to progress to such an extent as to endanger the health of the system, it will almost necessarily have become so large as to render the complete destruction of it by caustic, a severe and ravaging operation. We are then driven to the use of such topical and internal medicaments as may be best calculated to correct its morbid peculiarities, and convert it into a healthy ulcer. If its true characters have been masked by irritating and unsuccessful treatment, or by dissipation and other bad habits of the patient, we may be at first compelled to delay for a few days, before instituting any special treatment. Under the influence of purgatives, rest, low diet, and emollient applications, however, the natural disposition of every sore will soon be revealed, and then we can begin to combat its morbid character, according to the peculiarity of each individual case. If it continue to be an irritable sore, with elevated soft edges, and no induration underneath, we may have good reason to suspect it to be the primary symptom of the pustular or phlyzacious form of the venereal disease, in Mr. Carmichael's classification. If the surface is not really excavated, but only apparently so, in consequence of the raising of the edges above the surrounding parts—if there is an obstinate continuance of the irritation and inflammation after all general causes have been obviated on the part of the constitution, we may be confident that it is a case of that description. At all events, we may be satisfied that local irritants, as well as the mercurial influence, will all prove injurious, if a resort to them be allowed. Mild and soothing applications, with perfect rest, the regular use of laxatives and farinaceous diet, with antimonials and diluents, will more speedily relieve this condition of the primary as well as the consequent secondary ulcers, than any other plan. Mr. Carmichael was fond of light astringent

washes, like a solution of sulphate of zinc, and many of our surgeons have been in the habit of prescribing the black wash on lint, covered with a plaster of simple cerate, or an adhesive plaster. But a weak solution of the nitrate of silver, applied in the same way once or twice a day, so as merely to coagulate the secretions over the surface of the sore, and alleviate its irritability, will more speedily overcome the morbid peculiarities than any other application. If, after the irritability has been overcome, the elevated edges do not settle down to the level of the ulcerated surface, and granulations do not begin to appear, it will be necessary to destroy the whole edge by a light application of the caustic potass, in the same manner as we treat the morbid edges of a phagedenic ulcer. A slippery elm bark poultice will soon afterwards promote granulations, and complete recovery.

The buboes which often result from these irritable primary sores are mostly the result of sympathetic irritation. At least, the matter taken from them after suppuration, does not prove to be inoculable; and their characters differ but little from those of the sympathetic buboes from uncomplicated gonorrhœa. Mr. Carmichael, however, says they are peculiarly disposed to an undermining and elevation of their edges, and are invariably irritated and rendered more extensive by the action of mercury. He directs, exactly as we have recommended for similar cases after gonorrhœa, to pare away the undermined edges with the knife or curved scissors, after which operation, the buboes will generally heal with surprising rapidity.

When the primary affection commences as a livid spot under the epidermis, and speedily sloughs, or whenever it assumes a phagedenic appearance, we treat it by active escharotics, as has already been recommended under the general head of the phagedenic disease.

In all cases where the sore becomes indurated at the base, and assumes an indolent, sodden appearance, we at once suspect the existence of a real chancre, the result of a local contamination with the true syphilitic virus of John Hunter. No doubt old and indolent ulcers, in torpid habits, may present very similar characters when no poison has been applied to the part, and no reason can be found for suspecting the existence of a syphilitic taint. But such a source of perplexity to our observations can hardly have time to be developed during the first few days after the appearance of a primary symptom, as always happens in the case of a true chancre. The

induration of a mere indolent sore, moreover, does not afford that sensation of solidity and firmness to the touch which that of a real chancre possesses; neither does it terminate so abruptly, but diffuses itself gradually and imperceptibly into the surrounding parts, in which circumstance it differs from chancre so evidently as to be at once distinguished by an experienced practitioner.

"The induration of a chancre is not confined to the edges only, but extends under the entire surface of the ulcer. We often meet with chancres in which the ulceration is inconsiderable when compared to the extent of the induration, and even instances of an indurated tubercle or knob on the penis without any visible ulcer, which have been followed by the constitutional symptoms of syphilis, are not uncommon.* But on inquiry we shall probably learn, that in every such instance a small ulcer existed at first on the callous part, which healed under the use of some local applications. Chancre is,

* The induration of an ulcer on the genitals, has always been the great point of dread ever since the time of Hunter, and as long as it appears during or after an ulcer, there is reason to fear a contamination of the system. Whenever it reappears after the cicatrization of an ulcer, there is reason to dread a remaining lodgment of the virus. It is a much more visible sign than the discoloration and pain in the scar of a bite from a rabid dog, are ever thought to be of hydrophobia. Acton says, "M. Ricord never allows a patient to leave his hospital when the slightest induration, even of the cicatrix, exists; should he, in spite of admonition, quit, he is told that secondary symptoms will result, and the prediction is found to be too true."

To understand Ricord fully upon this point, it should be recollected that he makes a distinction between the first or primary stage of a true chancre, and its full development into an indurated condition. The followers of Hunter are bound to consider no sore as a chancre, except the indurated ones. But chancres never become indurated until a period of from six to eight days after their commencement. They were then called, by Hunter, simple sores; Ricord calls them, in that state, simple chancres. His experiments, by inoculation, have induced him to adopt the conclusion that they never contaminate the system until after they become indurated. Nor do they, according to him, where they have become phagedenic or sloughy, from irritation or a derangement of the general health. They must be indurated and remain so, to become either inoculable or the source of constitutional infection. This very statement, however, refutes all of Ricord's conclusions in opposition to Carmichael's classification of the phagedenic disease, as a distinct form of venereal. Mr. Carmichael's primary phagedenic and sloughing sores, do affect the system with a peculiar train of secondary symptoms, as we have seen over and over again. If the local phagedenic and sloughing sores, into which chancres may be made to degenerate under certain circumstances, can never infect the system, they are not possessed of the same characteristics.

in fact, an indolent ulcer, and makes but slow progress compared to those ulcers of the parts of generation which are destitute of any surrounding induration, and particularly the phagedenic and sloughing ulcers." Mr. Carmichael, from whose work we have extracted the above quotation, does not believe that repeated irritation can ever produce so great a callosity around an ulcer, as to deceive the most experienced practitioners, although he admits that in forming our diagnosis we should always take into consideration the previous management of the ulcer.

When the chancre is situated on the skin of the body of the penis, its surface is never excavated as on the glands and mucous surface of the prepuce, but, on the contrary, it is on a level with the surrounding integument with indurated edges, but its base less so than on the glans. It extends, also, to a much larger size, frequently almost surrounding the body of the penis, and presents a dark tawny surface. These external chancres, especially when they occur on the skin of the prepuce, are much more apt to be accompanied by inflammation than in any other situation. Perhaps this modification of them arises as much from the great laxity and disposition to œdema of the part, as from the especial liability there to the irritation of friction and motion. There can be no doubt, however, that other causes besides the peculiarity of location may occasionally induce modifications in the appearances of chancre from inflammation. Bad health from dissipation, intemperance, starvation, &c., may render it impossible for the parts to set up the true characters of the disease, at least until the general causes of derangement have been rectified. Thus, on the prepuce a complication with erysipelatous inflammation may arise, which will develop a foul, pulpy sore, in the midst of an angry, red, and tumefied part, the centre of which will be covered with a flocculent and partially detached mass of unorganized lymph. This variety of sore has been called, by the French, diphtheritic chancre, and can only be subjugated by rectifying the general health, and applying emollients and anodynes. If it be allowed to progress under irritating applications, it will run into sloughing, and, perhaps, make extensive ravages of the parts. Again, a large indurated chancre on the corona glandis, may become so grisly as to obstruct the circulation through its capillaries, and then, any considerable cause of irritation being added to it, a disintegrating and rapid species of ulceration will be set up, which may imitate phagedena. When a higher

degree of irritation occurs, it may be altogether overcome and slough away in a sphacelated state. These, indeed, have been called phagedenic and sloughing chancres. But they are very different from the primary affections which we have described under the head of the phagedenic disease. They are, when merely modifications of chancres, solely the result of derangements of the general health, and will always be treated accordingly by a rational practitioner. After rectifying the condition of the system, if the sores do not assume a healthy character, they must be necessarily attacked by escharotics or alteratives. The influence of mercury would, of course, prove as injurious for their irritated or sloughing condition as in cases of the genuine phagedenic disease. The fortunate result, however, of these conditions is that they generally prove curative of the chancrous disposition. As soon as the phagedenic ulceration subsides, or after the sloughing surface comes off, the aspect becomes that of a healthy ulcer, and suppurates and heals under mild dressings—a very different circumstance from that which occurs in the real phagedenic disease.

After the complications with inflammation, disintegrating ulceration, or mortification, have been overcome, if any specific disposition remains, the ulcer will, of course, refuse to heal, and will soon begin to assume the induration and torpidity of a true chancre. The same condition of things will then be presented as always occurs in cases of simple chancre, which have regularly progressed from the beginning without any complication. We shall then have to consider the question whether it will be proper to attempt to cure the disease without or with mercury. We can certainly cure the ulceration without resorting to that dreaded mineral. By the use of mild astringents and alteratives combined with any protective dressing, we can speedily effect a cicatrization of the raw surface in a few days, much quicker, indeed, than the whole disease can be cured with mercury. This fact has been the cause of the assertion by some writers, that the disease can be cured soonest without internal remedies of any kind. But such cases are only superficial. The induration always remains for a long time afterwards, and frequently breaks out again into repeated ulcerations. It is really a nidus or matrix for the lodgment of the poison, from which absorption will be sure finally to take place, to the contamination of the system. Even the operation of cutting out this induration afterwards by excisions, or the effectual destruction of it by powerful

caustics, will not always serve to protect the system. When such knobs or indurations exist on the prepuce, it has been the custom of many surgeons to follow the suggestion of Hunter, and excise them with scissors. But the cut surface is very apt to assume afterwards a chancrous disposition, unless an alterative course of mercurials be at the same time instituted. Some practitioners have also preferred to destroy the large indurations which sometimes remain on the glans, especially about the corona, by strong caustics, followed by blisters and other irritants, but they often produce extensive ravages in the substance of the organ, and excite very painful and long continued ulcerations. Although indurated chancres can be cured, as well as healed over without mercury, the methods of accomplishing this result are either so tedious, or difficult and painful, at the same time that they are followed by such an unsatisfactory conclusion, that we must be compelled to listen to the advocates of a mercurial course. Not that we are forced to admit that the remedy is ever likely to prove active as a specific antidote, but because we know it possesses peculiar powers of attenuating the impacted and semi-organized lymph, of quickening and altering the action of the capillaries and absorbents, and of augmenting all the various secretions and exhalations, in such a manner as most effectually to discharge all the foreign admixtures from the elements of the circulation.

All sound inquirers confess their inability to explain the cause of induration in chancres, or the mode in which the syphilitic virus influences its progress and termination. The infusorial, and the chemico-humoral doctrines are equally at fault here; and the closest observation as to the mode in which mercury acts upon the disease, fails in elucidating its nature. John Hunter, therefore, proposed to depend upon its manifest impressions upon the solids, creating new actions which must be incompatible with the diseased one, instead of indulging himself in any more painful abstractions. He was unquestionably right in his original conclusion, that mercury as a remedy, can do no more than relieve the existing symptoms. It does not go through the blood as an anti-chemical, or infusorial antidote, to neutralize or destroy noxious particles, as the old humoralists supposed. No matter how long its use be continued after the total cure of any existing symptom, it will ultimately be followed by a development of all the syphilitic affections, which the nervous and vascular systems may have acquired a disposition for, before the commencement of its action. As John Hunter said, the disposition

of parts to syphilitic action cannot be prevented, except by removing or curing the cause, before it has had time to affect them with that disposition. By the cure of an indurated chancre, therefore, even under the action of mercury, we cannot hope in all cases to prevent secondary symptoms. We can only promise to diminish the frequency of their occurrence in any given number of instances. All those cases which have, in the language of Hunter, acquired a disposition for constitutional disease before the action of the remedy commenced, will in the end hang out their "banners upon the outward walls." Ricord fully corroborates this view, which has always been adopted by the leading surgeons of this city. "The numerous observations which I have been enabled to make, lead me rather to consider a mercurial treatment as curative than prophylactic of certain symptoms;" page 248. Although the prompt cure by the abortive local method of Ricord of the small pustules and ulcers, which he calls simple chancres, will almost invariably prevent secondary symptoms, still an indurated state of the true chancre will, according to him, almost certainly affect the system if cured without mercury. Acton states, that it was laid down as an axiom at the Parisian hospital, that ninety-nine out of every one hundred indurated cases would become affected with secondary symptoms without mercury, whereas Ricord positively states, as the result of all his experience, that only eighty-six out of every one hundred, become affected from indurated chancres after cures by the action of mercury.* The correctness of such facts and opinions being

* This proportion of secondary symptoms is altogether greater than we have ever witnessed in this country, or than has generally been acknowledged by the British practitioners. Fifty or sixty out of every hundred of all the patients afflicted with true chancres, is about as large a number as ordinarily becomes affected with any constitutional form of the disease. Some practitioners, indeed, assert that they never have more than one-third of their cases affected with secondary symptoms. Is not Ricord's bad success in warding off the occurrence of secondary symptoms owing to his constant practice of inoculation? The virus can certainly be forced into the blood-vessels by this operation, so as to contaminate persons who might not have been affected by their own chancres. One or two additional sores transferred from every original chancre the moment it becomes decidedly specific, into the inner side of the thighs of the affected patient, will be very apt to increase the dangers of his constitutional contamination. All the philosophy in the world fails of curing our patients of their prejudices against this practice; and we shall probably have to depend upon Mr. Ricord for all our information in regard to this kind of experience for the res of our lives.

granted, it is impossible for us to conceive of mercury in the light of a real specific for the cure of syphilis. It cures the existing symptoms like every other remedy which acts on general principles; and it possesses advantages over all other known methods in a certain class of cases, because it proves more prompt and efficacious in eradicating the diseased condition. The true reason why it is peculiarly appropriate for the primary and secondary symptoms of scaly syphilis is, not because it possesses any antagonism to the infecting virus, but simply in consequence of the fact, that the chronic and unirritated form of the symptoms indicate such a condition of the system, as is found to be appropriate to the favorable influence of mercury in all other diseases. It is administered with equal advantage in almost all other chronic and unirritable ulcers and eruptions on the skin, in other deposits of indurated lymph about the glands, iris, cellular tissue and fibrous membranes, and in a great variety of rheumatic affections, which pass into a similar state of the system.

Notwithstanding this restriction of the use of mercury so far within the limits assigned to its employment by the older surgeons, we are in the habit of resorting to it in all cases of indurated chancre, very much in the same way as John Hunter employed it for the same purpose. We are governed, in common with most of the surgeons of Europe, by his great elementary principles as he developed them in his profound and original work upon venereal diseases. But we follow his principles throughout, instead of his practice. He could not, with all his independence and originality of mind, entirely rid himself of early prejudices and habits. Although he discovered the principle, and repeatedly insisted upon it, that mercury could do no good after fully curing the existing symptoms, still he frequently conformed to the then fashionable practice of continuing a long and harassing course, amounting to full and protracted salivation, in order to prevent the development of secondary symptoms. The consequence was, that the occurrence of such symptoms was deferred, but not prevented; and it only rendered them irregular, and sometimes exasperated in their character and consequences, when they did break out after its suspension. The same consequences resulted from a protracted mercurial course after the cure of the secondary symptoms in the first order of parts; it by no means prevented the danger of an occurrence of symptoms in the second order of parts. It could never overcome the disposition of those parts to manifest such

symptoms after it had once been taken on. On the contrary, it generally superinduced a cachectic habit, worse than scrofula, under the influence of which the bones would sometimes become carious or necrosed, and the system often sink under incurable hectic. We now give up the use of mercury altogether, as a decisive sialagogue, in every form of this disease. Salivation is never necessary to its curative effects in any case. Although we have no objection to a slight manifestation of its influence upon the gums, as indicative of its full action upon the capillary and nervous system; we never allow, if we can possibly prevent such occurrences, a loosening of the teeth, profuse discharges of viscid saliva, swelling of the tongue and irritative mercurial fever. They indicate a morbid or poisonous action of mercury; and not a curative one upon the system. No local or constitutional form of disease can progress favourably during its continuance. It is only after a subsidence of the mercurial fever, and during the protracted derivation from a diseased part by the horrible and exhausting discharge of foul saliva, that some diseases are starved out by absolute inanition. Well may the poor sufferer say under such circumstances, that the remedy is worse than the disease. Most would rather die than submit a second time to such a distressing course of treatment.

In administering mercury as a constitutional remedy, for the cure of indurated chancres and every other form of this disease, great care is now generally taken to select such a preparation or combination of the remedy as shall be least likely to develop its morbid or poisonous effects upon the system. It was formerly thought that large doses of calomel in an uncombined state of twenty to thirty grains given once a day, would be less likely to salivate than any other form of administration. This dose would purge actively the first day, and render the bowels absolutely torpid on the second and third, by which time it would make a general impression upon the whole gastro-intestinal mucous membrane, and extend it sympathetically throughout the system. In stout, vigorous, and healthy young men, like most soldiers and sailors, who can be kept secure in a hospital from the influence of cold and sudden vicissitudes of weather, this method will generally prove very safe and disperse large indurations of chancres and buboes in a very few days, without severe salivation or constitutional disturbance. It will prove too severe a treatment, however, in delicate and irritable subjects, and should never be resorted to in the most torpid habits, except every

indication can be fulfilled in the way of protective and precautionary management. Mr. Ricord's favorite mode of administering the proto-ioduret of mercury in combination with extract of hyoscyamus, has been of late much employed in this city. But it has not proved as speedily efficacious as the old favorite, the combination of blue pill and opium with ipecacuanha. It is, perhaps, less likely to salivate, but it produces a troublesome colic whenever it is given in doses sufficiently large or often to effect a manifest impression upon the disease. The majority of our practitioners still prescribe about three grains of the blue mass with half a grain of opium and ipecacuanha, each three times a day, at the same time that they attend carefully to the state of the system, especially of the skin and intestinal canal. In six or seven days a decisive impression will usually be made upon the disease, and in eight or ten more the symptoms will be entirely dispersed by the aid of proper local treatment. If, during this period, the gums at any time begin to swell, or the taste become brassy, the remedy must be suspended for a day or two, and a purgative administered, after which it can be resumed in less frequently repeated doses with perfect safety.

If, notwithstanding all our care, an inveterate disposition to salivation appears, we must lay aside the mercury altogether for a while, and after resorting to a daily tepid bath or vapor bath, with laxatives, diaphoretics, and, finally, tonics, at the same time that we are chiefly depending upon local remedies for a cure, we can afterwards, if necessary, try the bichloride of mercury in doses of one-twelfth to one-eighth of a grain, three times a day, in combination with the extract of conium or hyoscyamus and camphor. After allaying all irritability of the system, this modification of the remedy can frequently be given for a long time in the most troublesome cases, without exciting salivation. If such measures fail, we must depend upon iodine or arsenic as an alterative, in combination with sarsaparilla and other diaphoretics.

During the continuance of a general mercurial course, it is the common practice here to dress the sore, twice or three times a day, with lint moistened with the black wash and covered with cerate or adhesive plaster, after a previous ablution with a weak solution of chloride of lime or soda. Many, however, prefer the red precipitate ointment, or the citrine ointment, or the verdigris ointment, with or without an impregnation of creasote. The most active, however, of all such preparations, is the strong calomel

cerate, thirty grains in combination with two grains of one of the salts of morphium, to an ounce of simple cerate or lard. An occasional light application of the lunar caustic solution between the dressings, will aid very much in dispersing the induration and preventing all irritability of the parts. The moment cicatrization has been effected under any such applications, mild astringent washes should be resorted to every morning and night, and a protective cover of dry lint should be worn in the intervals, to insure perfect cleanliness and consolidation of the surface. The mercurial treatment should, of course, be laid aside the moment the induration as well as the ulceration has totally disappeared. It has then fully attained all its legitimate objects, and no advantage can be gained by yielding up our best ascertained principles to the prejudices of our patients or of the public.

In addition to such general treatment as we have just recommended, internal chancres up the interior organs of both sexes require an occasional application of solid caustic. This can be fairly effected by the aid of a speculum in a female, and a *porte caustique* for the male urethra. In the female vagina and upon the os tincæ, we can apply lint, either dry or medicated, with astringents or unguents, and confine them there with tents or compresses before we withdraw the speculum, so as to manage the chancres as effectually as when they are treated on the external parts. In the male urethra it will frequently be necessary to introduce a full sized bougie smeared with mild mercurial or calomel cerate, and to wear it there for considerable intervals of time, in order not only to expedite cicatrization, but also to prevent the development of a subsequent stricture. A flexible catheter can be worn in this way for several days in succession, until the internal chancre is entirely healed around it by the general influence of proper mercurials.

The buboes which often accompany the progress of a chancre, are of two kinds. The first is the common sympathetic bubo, from irritation or inflammation extending up to the ganglia in the groin, by sympathy or by continuous propagation, as we have already explained in the consideration of cases of gonorrhœa. This kind of bubo occurs early, and before matter can have been developed or absorbed, and generally occupies others or more of the lymphatic ganglia than the one to which the appropriate lymphatic vessels of the affected part directly pass. This kind of swelling is to be treated by common antiphlogistics, in the same manner as we have

explained under previous heads of this inquiry. But the real syphilitic bubo from lymphatic absorption, becomes a part and parcel of the true chancre from which it has directly originated. It does not only occur in the substance of the nearest ganglion into which the lymphatics pass, but sometimes, also, in the interior of the lymphatic vessels themselves, which enlarge and thicken when the virus, passing through them after absorption, becomes arrested at any particular point before reaching the nearest ganglion. Ricord has proved, by multiplied experiments, that these furnish an inoculable matter, precisely like that of the original chancre from which they have derived their origin; and he considers them, therefore, as nothing different from an internal chancre itself. They are truly chancres developed on the inside or interior of the lymphatic vessels or ganglia, in which a small particle of the virus happens to be arrested as it is attempting to pass into the system by the lymphatic route. There can be no reasonable doubt of the fact that the ganglia always arrest the virus and destroy it by a species of digestion, or cast it out of the system by a suppuration and ulceration. Whenever the constitution becomes contaminated, it must happen from a direct absorption through the medium of the venous or arterial systems. It may be set down as an aphorism, that lymphatic absorption produces buboes, and venous absorption the constitutional forms of syphilis. As patients in this country will not, except in very rare cases, allow us to verify our suspicions by inoculations, we must depend upon general considerations for deciding upon the characters of a bubo. If a swelling forms late after the commencement of a true chancre, or does not begin to appear until after the distinct and specific character of the sore has been developed, if it gradually and regularly enlarges with a dull aching pain, notwithstanding all our depletion and purging, and especially if it only occurs in a single point at once, and that near the root of the penis, or anywhere in the direct course of the lymphatics that lead from a chancre up to the main vessels of the trunk, we may decide, with strong probability on our side, that it is a bubo from absorption. As Ricord states that they do sometimes begin along the course of a lymphatic vessel before it has reached a ganglion, and first forming a knob, which afterwards ulcerates open, they finally generate an open chancre at the seat of the small abscess on the dorsum penis, or nearest portions of the skin. If the matter taken from these abscesses, when first opened, be inoculated, it will

reproduce a genuine chancre in any sound part. In cases of enlargement of the ganglia, however, it sometimes happens that an external periadenic abscess, which first forms around the gland, may be opened and afford no inoculable matter, when afterwards a smaller abscess forming within the substance of the ganglion, like an imperium in imperio, will afford genuine virus. This fact was first observed by Ricord, and affords a curious and interesting point in our pathology.

As real buboes are nothing but a second edition of the true chancre, although they were considered as intermediate symptoms by Hunter, their special treatment becomes necessarily involved with that of chancre. In addition to general and topical depletion, followed by blisters and iodine ointment, for the purpose of effecting resolution, as in cases of merely sympathetic buboes, we finally lay open the cavity of the unavoidable abscess, and apply the same topical medicaments as for the parent chancre, while we are, at the same time, employing the appropriate constitutional measures. A longer use of the mercurials, however, will generally be required than for the chancre alone; and sometimes pressure, or severe caustics, and repeated blisters will be necessary to facilitate the action of the mercury upon the indurated base and edges of the consecutive ulcer. Happily for our patients, as far as the necessity for protracted mercurial courses is concerned, true syphilitic buboes are of rare occurrence. The proportion of sympathetic swellings certainly exceeds them in the ratio of three to one, and often genuine chancres pursue their entire course without being at all involved with any form of the bubo, either in the groin, or on the dorsum, or at the root of the penis. Absorption by the lymphatics is one of the most unaccountable points in physiology, and in our pathological inquiries we can ascertain but very few cases of ingress of morbid matter into the cavities of these vessels. They certainly, however, serve to protect the system from the irritating effects of morbid substances introduced by natural absorption. Pus does but very little harm, comparatively, when taken up by the absorbents; whereas, a single drop of it, forced into the veins, is often followed by immediate death. It was, therefore, at one period generally thought that buboes could be formed by an arrest of the virus, absorbed from direct contact with the lymphatic orifices on the sound skin and mucous membranes without the intervention of any chancre, although it was at the same time admitted that a constitutional

infection could hardly, by any possibility, occur under the same circumstances. Such buboes were called *bubons d'emblées*, buboes from the commencement, and were then spoken of as familiar occurrences in surgery. Ricord, however, has fully cleared up all the intricacies of this question. He has submitted a large number of them to direct experiment, and never found one of them to be, under any circumstances, inoculable. Instead of originating from absorption of any specific virus, they must, when unconnected with every form of primary sore, have always been excited either by a direct or sympathetic irritation. It is a singular fact that chancres at the frænum in the male, and at the meatus urinarius, and on the ischium of the female, are much more apt to produce true buboes than in other locations; nevertheless, it is possible that those which form inside the urethra, or vagina, or even within the os tincæ, may give rise to a bubo from absorption, and there will always be danger of an incautious observer mistaking such an occurrence for a *bubon d'emblée*.

Inasmuch as the secondary symptoms sometimes break out during the exhibition of a mercurial course for the cure of the protracted primary sores, especially of the true and indurated buboes, superficial observers are apt to conclude that mercury causes the eruptions and sore throat. We have only to advert, however, to Hunter's great law upon the subject of the disposition for syphilitic action to furnish a satisfactory explanation of such occurrences. The disposition to the secondary form of the disease having been acquired before the exhibition of mercurials, of course the remedy could not prevent them from becoming manifest; although a continuance of the same treatment will, in general, speedily eradicate them along with the primary affections. In most cases, however, a distinct interval elapses between the cure of the primary, and the subsequent development of secondary symptoms, whenever they do occur, in spite of all our efforts at prevention. This interval varies from six weeks to six or eight months. Cases have been reported of only eight or ten days' interval between the first occurrence of the primary affection and the appearance of the secondary one, and on the other hand positive testimony has repeatedly been offered in favor of the opinion that several years may elapse between these occurrences. Although atmospheric vicissitudes, and exposures to a great variety of injurious causes may influence the constitution so as to modify the disposition to an evolution of secondary affections

amazingly,* still we have good reason to doubt whether so great a difference in the character of various cases can be effected by any combination of circumstances. Some mistakes may have been made by the relators and observers of the remarkable cases just alluded to, especially in regard to the possibility of older or later contaminations, than had been suspected perhaps even by the patients themselves.

No other interfering circumstance so far modifies the secondary symptoms in regard to their time and mode of development, or their subsequent progress, as the previous administration of mercury. Even the salutary and perfectly regular operation of that mineral upon the system, in the cure of the ordinary primary affections, will disturb the natural mode of developing the disposition to syphilitic action. But a protracted course, especially for a length of time after the disappearance of all previously existing affections, will disarrange the order of symptoms. Especially will this prove the case, when the remedy has not proved appropriate or curative for the original affection; and above all, when it has acted as a morbid poison to the system, by inducing excessive salivation or mercurial erethism. Then a depraved or cachectic habit will certainly be generated under the influence of which everything but a natural development of the true syphilis in its secondary forms will be manifested.

The observance of the Hunterian doctrine in regard to the disposition acquired by certain parts for syphilitic action, is in no respect so important as when it concerns the operation of mercury. If the parts have once acquired a disposition, it must become manifested,

* Mr. Acton makes the following observations in regard to the evolution of secondary eruptions: "Can this period be delayed? It can, as we have had ample opportunities of observing. When due precautions are taken, no excesses of exposure to cold submitted to, weeks may pass over, and no secondary symptoms appear; but under the influence of predisposing causes, they suddenly break out. The employment of mercury in insufficient or injudicious doses appears to have the same effect; the disease is retarded, and we have seen it appear some months later, and have been unable to attribute it to any other cause. It results from the preceding observations that the absorption of the syphilitic virus induces a *syphilitic temperament*, a peculiar state of system which care holds in abeyance; the germ exists, but some extraneous cause develops it, and must call it into action; as a fall on the knee, or inflammation of the chest, develops white swellings or phthisis, so does exposure of the surface to cold, or insufficient diet, cause one of the forms of secondary syphilis which we shall presently describe,"—*i. e.*, eruptions and sore throat.

and the first rule is, not to attempt to check the development of the symptoms until they are fully evolved. If we begin to give the remedy on the first appearance of a bleached and crescentic patch on the tonsils, or on the first show of mottled and papulary appearance on the skin, we may cause the symptoms to recede for a while, but the moment we suspend the action of the remedy, the eruptions will reappear, and probably in a more irregular form; and will be more obstinate in their progress than before. We shall find that we have only scotched the snake, not killed it. The same thing happens at the development of the symptoms in the second order of parts. It is thus always best to defer the exhibition of mercurials until after the nodes have been somewhat raised, and the pains have been combatted by previous antiphlogistic and sudorific remedies. The disposition to action having been once fairly manifested or called into service, it would appear as if nature could then be more contented to yield under our treatment; and when she does yield, the cure will afterwards prove more satisfactory and permanent. Perhaps, however, something should here be attributed to the state of the system for which mercurials are most appropriate. During the first three or four days of the progress or development of each order of secondary symptoms, there is always more or less febrile excitement present in the system, although, as we have before observed, it is never so obvious as in the other forms of venereal diseases. It would, on general principles, therefore, appear best to delay the use of mercurial preparations until by moderate depletion, purgatives or antimonials, we have reduced all the irritation and fever, and rendered the system more assailable by the remedy as a curative agent.

The cure of the secondary symptoms in the first order of parts by the internal use of mercurials, requires a much shorter time than the primary indurated chancres.* John Hunter attributed this fact to

* Surgeons in general do not observe any material difference between the modes of administering mercury for the primary and secondary symptoms. In this country we have pretty generally abandoned the method by inunction. It rarely happens that some form of combination or preparation cannot be exhibited with equal advantage by the mouth. In inveterate cases, in which the stomach proves intractable, mercurial fumigations are much more likely to prove successful than inunctions, and they are much more cleanly and manageable among private as well as public patients. For the secondary symptoms of both orders especially, they are vastly more efficient than the ointments. But we find it very rarely necessary to use them in this country. We generally com-

the dilution or weakening of the virus, before it could reach the implicated tissues, so as to affect them with a disposition to syphilitic action. The reason he suggested why the second order of parts was not, on that supposition, still more easily cured, consisted in the circumstance, that the bones and their appendages are more torpid and sluggish in their powers of taking on and supporting actions of every kind. They are of course slower in yielding to the influence of remedies, and it always requires about as many months to relieve the disease in the second order of parts effectually, as it does weeks in the first order. The opinion of Ricord, that the preparations of iodine are exclusively beneficial in his tertiary symptoms (which include all of John Hunter's symptoms in the second order of parts) is not acquiesced in by any of our experienced surgeons. Iodine is a good adjuvant in those forms of the disease, and is very much employed here in combination with mercurials:—but no practitioner has ever yet found it possible to dispense with the truly heroic remedy in the last and most protracted form of real syphilis.*

mence with the blue pill, in combination with ipecacuanha and opium, and as soon as the gums are slightly touched, we change them for the bichloride in combination with sarsaparilla syrup, and frequently with iodide of potassium mixed with both. This is the formula: ℞.—Syrup. sarsæ. comp. ℔iss.; hydrarg. bichlor. gr. ij.; potassæ iodidi ʒj. M. S. Dose, a tablespoonful four times a day. This can be continued for two or three weeks, if necessary, after the supension of the blue pills, and until all the blotches have perfectly faded away. The frequent use of tepid baths and vapor baths and diluent drinks, aid very much in dispersing the eruptions and clearing the throat; but especial pains should all the time be taken to keep the hepatic and intestinal secretions regular. Warm clothing, and frequent changes of the flannel and body linen, will also be required to ensure a rapid and perfect cure of the cutaneous form of the disease. The disciples of Ricord all agree in the propriety of a mercurial course for these secondary symptoms, although they generally lay them aside in the managment of all the tertiary affections, and depend exclusively upon the use of iodine. The plan of Ricord himself is, to begin with ten grains of the iodide of potassium a day in three divided doses. The doses are afterwards augmented by ten grains every five days, until the amount of one hundred grains is taken every day. He gives it largely diluted in the syrup of poppies, or sarsaparilla, or some bitter infusion. In these large doses, however, it often disturbs the stomach, and has, therefore, to be temporarily suspended from time to time. It also irritates the skin sometimes, and forces out eruptions like *acne*. Its most favorable action upon the system, is generally associated with a decided influence upon the kidneys.

* The nodes and nocturnal pains are generally treated here by antiphlogistics and diaphoretics at first, followed by blisters over the affected parts, which are afterwards dressed with mercurial ointment and laudanum, or with iodine oint-

Even in the last or declining stages of the other forms of venereal diseases, for which mercurials are universally considered inappropriate, the same combinations often come in as successful remedies. Both iodine and sarsaparilla do appear to have the power of depriving mercury of its most injurious properties, and shield the constitution, under many circumstances, from its irritating effects. In some instances, however, arsenic, in the form of the arseniate of potass, has done more good than either iodine or mercury, as an alternative for the tertiary symptoms of Ricord. It alters the secretions and exhalations, especially on the skin and mucous membranes, and sometimes influences in a decisive manner the syphilitic as well as scrofulous affections of the fibrous tissues. Old and unmanageable nodes and enlargements of the bursæ and ligaments, often yield to its action, especially when combined with large draughts of sarsaparilla decoction, and an occasional fumigating bath of sulphur. Warm salt-water or sea-water baths also prove, in many cases, very beneficial as auxiliary means of treatment. The muriate of gold has by no

ment; lunar caustic is also an excellent application. The mercury is commenced with in the form of calomel combined with Dover's powder every night. The bichloride in doses of one-eighth of a grain made into a pill, with three grains of ex. conii, and repeated three or four times a day, is afterwards given for a time, while the calomel and Dover's powder is still continued at night. As soon as the gums become affected, these are laid aside, and the bichloride is given in combination with extract of conii, while the iodide of potassium with sarsaparilla is at the same time abundantly administered for weeks in succession. The conium is given by some practitioners to the extent of from forty to sixty grains every day as an alterative and anodyne. There is no occasion, however, for pushing the remedy in all cases until every sign of swelling or thickening on the bones disappears. We often cure the disposition of the parts to further syphilitic action before we get rid of all the consequences of the disease in the bones. Nor is it ever necessary to push the remedy to a severe impression. I always suspend it for intervals of two or three days, whenever the gums appear affected, and go on with it again in moderation as soon as the salivation ceases to threaten. The occasional use of the vapor bath cannot be too highly extolled, as an adjuvant to the mercurial course for syphilis in this order of parts. Diaphoretics, indeed, in every shape, become exceedingly useful after the mercurial impression has once been fairly made, and by a steady use of them in connection with farinaceous and milk diet the worst cases can be relieved after all other treatment has proved injurious. The iodide of potassium pushed to the extent of a drachm daily, often affords decisive relief at this period. Cachectic habits, however, sometimes require a change of air if not of climate. I have seen the most desperate cases speedily cured by going to the sea shore, and also to Bedford Springs and other mountainous regions, in the summer season.

means proved so generally useful as was at one time believed by our practitioners. The only class of cases in which it has been found serviceable, has been in old and worn out cachectics, with carious spongy bones and anæmia from colliquative discharges.* It then appears to do good occasionally, by easily parting with its concrete oxygen to the circulation and restoring the arterialization of the blood. The precipitated carbonate of iron will, however, answer the same purpose, and is more commonly used under the same condition of things. In fact the chalybeates which were, in former days, so universally employed for cachectic habits of every description, are now fast recovering their ancient reputation.

Hereditary syphilis is a very rare disease in this country. Most of the cases which have been witnessed by those largely engaged in practice here, have occurred among infants shortly after the delivery of contaminated mothers. The primary symptoms with which they are more frequently affected, are always the result of direct contact with the vaginal secretions during their birth, and are best designated by the term congenital venereal diseases. The treatment of all such, however, will be fully understood from the observations which have already been made under the head of gonorrhœal ophthalmia and simple chancres. Local treatment has always succeeded for that class of affections, without the necessity of resorting to mercurials. But the constitutional forms of the disease which, according to Carmichael, are always truly syphilitic, and occur from contamination through the medium of the placental circulation, have to be encountered by a regular course of mercurials. In general, two or three grains of the *hydrargyrum cum creta* twice a day will overcome the eruptions, and blotches, and ulcerations of

* In the year 1819, I saw an active course of the muriate of gold cure a very low case of prostration from tertiary symptoms, connected with scrofula, or perhaps scurvy. It was in the person of a Mr. T., a book-binder, who had been confined to his bed for many months, under the care of a number of empirics, before he called me in with a request to have Dr. Physick also in consultation. Dr. Physick attended him with me for about six months, during which time we gave the triple muriate of gold one-sixth of a grain, and ex. conii three grains, in a pill three times a day, for about a month. This produced a slight salivation, but without any fœtor or ulceration of the mouth, and a beautifully florid and fresh-looking state of the gums. He took sarsaparilla, also, and animal food, and finally recovered from a terrible cachexia, accompanied by caries of several of the bones, and enormous flabby and pale ulcers. He had large periosteal swellings on the skull, also, which wholly disappeared.

the mucous membrane in the mouth and throat, in about sixteen or eighteen days. The blue mass, rubbed down in simple syrup, and given in doses of half a grain twice a day, will answer as well, and sometimes more promptly in inveterate cases. Very small doses of corrosive sublimate, from one-sixtieth to one-fortieth of a grain, are also very efficient when given in combination with sarsaparilla syrup. The moist condylomata or mucous tubercles, which often appear about the lips, and mouth, and scrotum, and anus, of infected children, are best treated by washes of chloride of soda and dry lint, with an occasional touch of lunar caustic. Ricord treats them with certain success by washes of common salt water, followed by dry calomel and lint. The dry and hard condylomata, however, require excision or strong escharotics. Prompt measures should be at once resorted to on the appearance of the mucous tubercles, for, as we have said before, numerous and authentic observations have proved that they may become contagious and extend the disease to nurses and other children, by contact with the acrid and offensive humor which they discharge. Ricord's failures in propagating them by inoculation, no more disprove their contagious qualities than do his parallel failures in cases of virulent gonorrhœa uncomplicated with chancre. Gonorrhœa will reproduce itself in almost all persons who are indiscreet enough to expose themselves to its influence, notwithstanding the fact that it could not be transformed into a chancre by the most ingenious inoculations. It is somewhat singular that so acute an observer as Ricord, should not have thought of the great difference between direct contact of certain poisons with susceptible mucous surfaces and the attempt at inoculating them in parts which are not appropriate to their actions. The external integument can never elaborate gonorrhœal virus, or perform the actions which are necessary to its development. On the contrary, almost any part of the mucous or internal integument can be thrown into a gonorrhœal suppuration by mere contact of the virus, and that too, without any sort of inoculation or breach of surface. Moist and discharging mucous tubercles can, in the same way, affect the delicate surfaces of the mouth and nipples of healthy nurses, although they may have been derived solely from hereditary propagation. Notwithstanding all the ingenuity with which the experiments of Ricord and his associates have been conducted, it is evident that the inferences made from them have been overdrawn. They have proved only one point, in-

deed, conclusively, and that is that the virus secreted by a genuine indurated chancre possesses the peculiarity of being inoculable in the person of the same subject, which is at the time affected by them. It does not appear that the virus was in any one instance transferred by these experiments to another person. Indeed, Acton expressly states that Ricord never ventured upon such a trial for fear of disastrous consequences; and he desires to claim for his great master credit for that piece of humanity. But it is very possible that other poisons than that derived from a chancre may have the power of contaminating unaffected persons by inoculation, although their impressions may have been weakened by the actual presence of the disease in every individual patient himself in whom the virus has been generated. A variety of other objections must occur to every inquiring mind against the validity of the inoculations as heretofore practised, in the way of forming a sound pathological estimate of all contagious diseases. But we have already devoted too much space to the subject of syphilis, and must, therefore, proceed to the consideration of other not less important points of inquiry and discussion.

MORBID GROWTHS.

The consideration of preternatural and morbid developments of structure has always been regarded, in a practical point of view, as one of the most important subjects in surgery. But since the investigations of modern observers it has become a matter of the deepest interest in a pathological respect. It will no longer answer the purpose of intelligent inquirers to make an artificial division of this extensive class of diseases into the two general forms of mild or innocent, and destructive or malignant tumors. The superficial notices of them which are to be met with in most of the elementary treatises on surgery will afford no more satisfaction to our readers than the picture books of children do to the thorough cultivators of science. In order to gain a clear comprehension of this intricate subject, we must go back to the first principles of physiology, and consider the leading opinions which have been advanced concerning it with some degree of method as well as prolixity.

Interstitial enlargements of the natural tissues, as well as the wrong deposits of the healthy elements of nutrition, may all be converted, by degeneration or subsequent perversions of action, into morbid structures, and thus an equally difficult case for elucidation and treatment arise as after the original formations of malignant growths. No single or restricted field of inquiry, therefore, on which this subject may be estimated, can ever prove sufficient to cover the whole extent of circumstances and phenomena which concern this department of surgery. All the modes of healthy as well as of unsound nutrition must be understood; the regular and perverted courses of exhalation and secretion, the true condition of humoral pathology, and the influence of solid actions and reactions must also be investigated, before any rational or valid conclusions can be arrived at in the way of forming general principles for the benefit of practical surgeons. Although the essential nature of these diseased processes can no more be understood than the occult causes of the healthy actions themselves, still the general character and laws of the morbid excitement, which eventuates in abnormal deposits, can always be calculated by philosophical observers.

At one period it was supposed that an excess or perversion of any one of the elements of the blood would necessarily produce similar derangements of organization in the corresponding solid structures. A redundance of healthy fibrine was conceived to be the origin of hypertrophy in one or more of the muscles, of inflammatory exudations among or around other textures, and of preternatural fibrinous tumors in the various regions of the body subject to such growths. An excess of the calcareous phosphates and carbonates was supposed to be the cause of exostoses and other bony enlargements, in the same manner that an over proportion of diluted serum was laid down as the cause of dropsy. Perversions in the constitution of fibrine and albumen, originating from a defective assimilation, were, moreover, resorted to in explanation of all morbid deposits in and around the living tissues; and thus a simple modification of the old humoral pathology was made to solve every problem under this head of our inquiry. The later chemists have done much towards confirming this mode of theorizing in surgery. The followers of Liebig and Mulder, especially, have almost established a school of chemico-pathologists, which now bids defiance to ridicule and maintains a very respectable show of argument. By a very slight change in the proportions of one or more of the

elements of the quaternary or quinary compounds of animal substance, they point out how almost every conceivable change of organic material can be effected, and, of course, how tumors and perversions of structure can be elaborated within the human body. The attempts at modifying this doctrine by the infusorial hypothesis, which assumes the introduction of various orders of animalculæ through the medium of the circulation, have proved almost too futile to deserve a serious notice. After all, it has done little more than to add the notion of animation to the conceptions which we attempt to form, of the smallest particles or integrant molecules of matter that float among the general elements of the blood. All the infusoriæ which have actually been injected into the circulation of animals, have speedily perished and disappeared under the influence of the vital and organic reactions, and no proof whatever has ever yet been afforded of their possessing the smallest degree of influence over the generation of organic diseases. The same thing may be said of the supposed influence of parasitical fungi and hydatids, which were once supposed to play so important a part in the same class of affections. There is no such independent circulation, or any other mode of peculiar existences even in the largest foreign growths, as can give countenance to the idea of a separate vital condition from the general system of the body subject to the disease. The entozoæ which actually do exist in the form of worms and the acari, exert no influence upon the formation or continuance of tumors; nor has the recently elaborated doctrine of the altered cell corpuscles of the blood, done anything more towards elucidating this intricate subject. When it was first introduced to the consideration of the speculative, it was fondly hoped that by the aid of powerful microscopes we could be able to detect the pre-existing germs of all organic diseases in the general circulation, and decide not only as to the species of affection, but also concerning the degree of constitutional contamination. It was even thought that cancers could thus be distinguished from scrofula and all other more innocent diseases, while, at the same time, we could form a conclusive opinion as to the propriety of attempting or declining a surgical operation, or of instituting any mode of local treatment for the purpose of affording relief. But all such attempts have proved to be illusory, and we can gather no other practical knowledge from the use of the microscope than what is connected with the minute

anatomy of the morbid structures after they have been elaborated.* Organic chemistry has done all, and will continue to do all that ever can be accomplished in the way of advancing a sound pathology of the humors as far as concerns the conversion of their various

* The following quotation from Vogel's great work on pathological anatomy, just translated by Day, and republished in this city, will convey the fullest idea of the present doctrine among the experienced in Europe. "That the pseudoplasmata are not produced by metamorphosis of the normal tissues, but that, like all other pathological formations, they take their origin from an amorphous cytoblastema, is indubitable: observations which establish this will be adduced in our observations on the individual pseudoplasmata. It is no less indisputable that this cytoblastema is furnished from the vascular system, especially from the capillaries. It is possible that the cytoblastemata of the pseudoplasmata from their earliest stages differ from those of the other pathological epigeneses. I have had repeated opportunities of examining such cytoblastemata, *but have never been able to detect any peculiarity in them.* Our knowledge of the different protein compounds is, however, still very imperfect, and we possess no means of recognizing more microscopic quantities. This question must, therefore, for the present, remain unanswered. Our knowledge is not more definite regarding the causes which lead to the formation of the pseudoplasmata. The present state of this subject may be thus briefly summed up; firstly, it may be assumed that the formative cause consists in a depraved condition of the fluids, *i. e.*, certain elements of the blood become changed, or there occur in it new and peculiar substances, which, after their deposition in the parenchyma of organs, necessarily become converted into pseudoplasmata. According to this view, therefore, there already exists in the blood, previous to the formation of any pseudoplasma, a cancerous or tubercular matter, whose deposition, upon a given spot, may determine the localization of disease, or its propagation to several organs may result from the first deposition not removing the whole of this matter from the blood. Through the continued production of this matter and its deposition in various parts of the body, the disease becomes constitutional. Against such a view, which attempts to explain the disease solely on the principles of the humoral pathology, there may be urged weighty objections. *In the first place, such specific morbid principles have not, as yet, been demonstrated; indeed, the failure of every attempt to trace them renders their existence very improbable,* and if, nevertheless, in modern times, certain physicians" (here he plainly alludes to Carswell and his followers), "speak of such matters (stating, for instance, that tubercles consist of caseine), this only shows the deficiency of their knowledge of organic chemistry."

The above extract, from the most learned and sensible of all the German authors, will exhibit some of the novelties of pathological terminology, at the same time that it puts at rest the suggestion of Carswell and others in regard to the detection of pre-existing cancerous matter in the blood. It is to be feared, however, that it will frighten some of our readers into the safety boat of a Greek Lexicon, before they can escape from the breakers of hard words and new fangled epithets.

elements into the solid structures which are preternaturally formed within the animal body. There is no anticipating to what extent the progress of galvanism may not carry our knowledge in connection with this intricate department of science. The circumstances under which all the transmutations of the various vegetable and animal elements can take place, may hereafter become elucidated as clearly as we now estimate the sensible qualities of the same things. But the influence of the solids will always have to be brought in for its full share of importance in the development of these processes; and the *whole circle* of the organism and functions of the body must be taken into consideration before we can expect to understand the phenomena of diseased nutrition. If a morbid condition of the blood were alone productive of unnatural growths, the formative substances ought to be effused from the capillaries everywhere throughout the whole constitution. Deposits in particular parts or regions can only be effected by the influence of solid predispositions and reactions on the very points where the local diseases are manifested. When we see the nervous energy, independently of its obedience to the will, or the emotions of the mind, or the reflex actions of the spinal cord, exerting such a powerful control over the blood-vessels and their contents, as is everywhere exhibited, we can experience no difficulty in conceiving of its participation in this result. Notwithstanding the access of so many agents through the medium of the circulation, it is chiefly through the nervous system that causes operate for the production of almost all kinds of disease, and the remedies also to which we resort for the relief of them. Impressions made upon the solid fibres of the living body do infinitely more good than dilution or chemical antagonism of any kind directed to the fluids, whether in motion or a state of rest. Although the solids are produced from the fluids, still they control them, and elaborate by far the greater number of changes which are effected in their various elements during the continuance of life. Even the new cell doctrine cannot escape from the same restrictions. After the vessels and nerves, and other solid tissues have once been formed, the nucleated and formative cells must everywhere be subjected to their influence, and can only act under obedience to the vital properties of the system.*

* Vogel says, p. 160, "They" (elementary granules in the substance of coagulated fibrin), "always arise from fibrinous dropsy, of which the fibrin has

The exclusive advocates of the formative and organizing power of cells have ran far off from the solid foundations of philosophy, and strayed away among the fogs of hypothesis. Like the doctrines of integrant molecules in chemistry and primitive forms in geometry, it may serve to aid us in explaining some of the elementary laws of living matter; but it is very doubtful whether it can ever be carried out so far as to afford any benefit to practical science during the labors of our profession. We will endeavor to show, however, the extent to which it is applicable in the development of the particular forms of preternatural growths, which we shall proceed to discuss under the head of tumors.

TUMORS.

Notwithstanding the difficulty complained of by some authors, of drawing up a comprehensive definition of a tumor, we are disposed to remain satisfied with the statement of Hunter, that it is "a circumscribed substance, produced by disease, and different in its nature from the surrounding parts." Although this definition may appear to include some tumefactions, such as abscesses, hernias, aneurisms, &c., which have never been recognized as tumors, still the general consent of all practitioners has allowed for the peculiarities and points of remote and accidental resemblance in such other affections. All the other definitions which have ever been offered are liable to still stronger objections, and will be found to include a greater number and variety of dissimilar maladies. It is impossible to give a perfect and unexceptionable definition to any class of objects which have not fixed and specific points of resemblance to each other, and equally distinctive ones from all others that may be compared with them. Accuracy of arrangement, however, will prove of but very little importance in this case, provided

coagulated, and are to be regarded as solid cytoblastemata, whose further *development was interrupted by the death of the organ* which was attacked. *Had the life of the organ been prolonged* they would, according to circumstances, have been changed into the several kinds of epigeneses, into concretions, areolar tissue, fibrous tissue, pus, non-malignant or malignant tumors, or they would have been resorbed." Fibrinous dropsy, in the language of the German pathologists, means inflammatory exudation of coagulating lymph under adhesive inflammation.

we do not omit to speak of all the practical matters and pathological points of interest under each particular head of inquiry.

The attempt made so boldly by the celebrated Abernethy, to divide the different forms of tumors, according to their structure, into groups, and to regard them as so many species, has been considered in some measure as a failure by the profession; but, unfortunately, no better plan of classification has yet been instituted in any part of Europe or in this country. Some have continued to consider tumors almost *seriatim* as so many individuals, according as they meet with them in practice: others have adopted the old division into mild or innocent, and malignant; and, of late, the distinction of them by Muller into *homologous* and *heterologous* tumors has been preferred. We need not scruple to take advantage of each and all of these methods, and to adopt so much of them occasionally as may best suit our purposes. Each of them, when wholly depended upon, will be found to be liable to peculiar objections and disadvantages, all of which we can avoid by making an occasional and comprehensive reference to the whole.

I. NON-MALIGNANT TUMORS.

The simple and innocent, or non-malignant tumors, compose a highly diversified class, and will require a detailed specification of particulars or peculiarities as such circumstances occur in each form or species. The epithet *homologous*, so strongly insisted upon by Muller, is by no means applicable to most of them, because they are not universally of the same composition with the surrounding structures, and sometimes not even with any natural organization of the system. Thus a variety of encysted tumors form among the deep seated parts, which contain peculiar secretions in the form of contents, wholly unlike the exhalations in the surrounding cells and membranes, and their cysts are, moreover, decisively modified so as to differ from the neighboring tissues. Indurated, and fibrous, and cartilaginous tumors also form with a very different modification of structure from what occurs in either of the natural analogous tissues. Still all such are very likely to prove destitute of any malignant attributes, and come under the category of innocent growths. They are called non-malignant because they do not contaminate the

surrounding parts nor the system, and are not liable to return after their complete extirpation.

Encysted Tumors.

The first species of this class or genus of which we are naturally led to speak, is the simple encysted tumor, which is insulated from the surrounding parts by a distinct membranous sac containing an *unorganized* secretion or deposition. It differs from the cystoid or compound encysted tumors, inasmuch as they all contain *organized* formations in their interior, and are, of course, altogether more complicated in their structure and characters.

The simplest variety of this species is the subcutaneous follicular cyst, commonly denominated a *wen*. Sir Astley Cooper's explanation of a majority of these is certainly the correct one, notwithstanding Von Walther and others have objected to the general applicability of it to the constitution of all externally situated tumors of this kind. A large proportion of all cutaneous and even subcutaneous tumors will present, on a close inspection, a small pit or depression in the centre, frequently filled with a black concretion, which leads into a cavity underneath containing sebaceous or pulpy matter. No matter whether these are called atheromatous or fatty tumors, they certainly are produced by an obstruction of the orifice of one of the cutaneous follicles, and a distension of the cavity below from retained or perverted secretions. If the black concretion be picked out, and the orifice enlarged by a probe or the point of a lancet, the contents can often be squeezed out in the form of a lardaceous, or pulpy matter.* Sometimes a severe inflammation from contusion or over-distension has begun to convert them into abscesses, and then such a practice will be more proper than any

* The small follicles on the nose, and cheeks, and ears, which become obstructed in this way, and frequently deform individuals by becoming very numerous on these exposed parts of the countenance, under the denomination of "black heads," have been found occasionally to become the nidus of insects and small infusorial worms. Mr. Wilson has recently detected the larvæ in the fatty matter which he pressed out of them under the microscope. But the larvæ must have been accidentally deposited there by the insects, and could have had no share in the production of the disease. Mercury has in the same way gained access to these distended follicles after the endermic treatment by inunctions, which could have exerted no influence in creating any obstruction there.

severer operation.* Excision, under such circumstances, would prove unnecessarily painful and even hazardous. After the full evacuation of their contents, a soft poultice will often produce a contraction of the follicle to its original size, and effect a complete cure. If the tumor returns at any subsequent period, the extirpation can finally be performed under much more advantageous circumstances.

All attempts at dispersing these tumors by topical depletion or embrocations will prove useless, and when the size becomes disfiguring or troublesome, the patients generally insist with great propriety upon a radical cure by excision. Where they occur on loose and lax subcutaneous cellular substance, it is generally very easy to remove them by a simple incision. No dissection is then required. The moment a fair incision is made across the centre of the tumor, the whole sac and its contents can be turned out from its seat and everted by simple pressure, or a push with the blunt end of the knife handle. If the skin is very thick and the subcutaneous tissues firm and unyielding, as happens on the back of the neck and some parts of the face, it will be best to follow Sir Astley Cooper's advice, and cut the whole sac perfectly in two by a deep blow of the knife, and then, after turning out the contents, dissect out the two halves by the knife and forceps. Sometimes they can be readily extracted by the forceps or hook after such an incision, without any further dissection. In cases of such loose cysts under the hairy scalp, all we have to do is to make a slight cut in the skin over the centre, and then a small degree of force applied by means of a

* It is asserted by some writers that these tumors sometimes slough or ulcerate entirely away after severe inflammation, and leave a perfectly healthy sore, which finally cicatrizes effectually. I have seen them produce very painful and offensive ulcers, however, which required careful treatment, and sometimes entire extirpation of the remains of the sac by the knife or escharotics. In one case, of an old lady whom I saw in consultation with Dr. Levis, in Marshall street, a large scalp tumor of this kind degenerated into a shocking and painful cancerous looking mass of ulceration, and could not be cicatrized after all vestiges of the original sac had been removed. It may be pronounced very unsafe, therefore, to wait for the spontaneous efforts of nature to get rid of such tumors, especially when situated on the head. Nor will it ever be proper to leave any portion of the sac unremoved if we wish to effect a radical cure. If any part of it remains behind after an operation, it cannot, on account of its epithelial investment, become united to the opposed parts; it will continue to secrete sebaceous matter and flattened epithelium cells, and reproduce the encysted tumor as before.

scoop or any blunt pointed instrument, will force out the whole cyst without any necessity of laying it open. No hemorrhage will then escape, and we need only apply a dossil of lint and plait the adjacent locks of hair over it to constitute the dressing. The few drops of blood which first exude and coagulate in the lint and hair become the best kind of adhesive plaster.* These cysts on the scalp, which often become numerously multiplied, increase in thickness and firmness as they grow larger, until finally they appear cartilaginous or parchment-like in consistence, and almost resemble a bony plate or sac. They then become so detached from the skin above as to destroy all appearance of the outlet of the original excretory duct of the sebaceous follicle, and this is the circumstance which has chiefly induced some critics to deny the correctness of Sir Astley Cooper's opinion in regard to their origin, and designate them as fibrous sacs on the cranium.

Indeed, it is questionable whether some subcutaneous cysts of this kind do not occasionally form under the scalp, independently of all follicular obstructions. Contusions frequently separate the firm skin from the epicranius tendon below, and occasionally that flattened or aponeurotic tendon from the pericranium still deeper below the skin, and constitute a small bloody collection or abscess there. These sometimes finally become chronic, and are gradually converted into encysted tumors, which acquire a firm sac by condensation and agglutination of the enveloping cellular substance, and may become lined by a decided epithelium. The contents of such, however, are always more fluid, and decidedly distinct from those of real follicular wens. The same remarks might be made in regard to similar encysted tumors developed near the surface over other especially prominent parts, and which bear a very slight analogy to follicular tumors. Small subcutaneous abscesses occurring in scrofulous subjects should never be confounded with either of these cysts, although it cannot be denied that such a mistake is often made, especially in their earlier stage of development. The want of compound layers on the interior of the cyst, which are produced by detached epithelium scales and its basement membrane, will always serve to enable us to distinguish such cavities

* When the cysts on the head have become very large, the redundance of the skin, especially if it be thin or ulcerated, will have to be taken away between two elliptical incisions, in the same manner as we remove fatty and fibrous tumors of the scalp of the same size.

from the true cutaneous cysts. The idea that coagulated blood, or effused fibrin, can ever be condensed into split-like layers on the inside of such sacs, so as to resemble the compound layers of false membrane on the inner surface of the obstructed follicles, is altogether unfounded. The epithelium which lines all close sacs that never had an external communication with the skin, is always like that of the serous or synovial membrane, and never exhibits the peculiar detached layers of pavement or cylindrical epithelium cells, which are thrown off in succession after each other, in the cutaneous follicles, as well as on the outer surfaces. Nor can it secrete hairs, or horny excrescences, or bony structures, including teeth, although some have asserted to the contrary.* In the originally closed or

* The encysted tumors which have contained hairs, bones, and teeth, and which are generally met with in the ovaria, are supposed by Cruveilhier and others to be the enclosed remains of partially absorbed fœtuses. Hairs, however, are often met with in cysts about the eyebrows, temples, and scalp; and bony concretions (which are, however, nothing but dried epithelium scales) are occasionally detected in cysts on many parts of the surface. Even teeth, more or less perfectly formed, were once found in a cyst in the orbit of one of the eyes, by Mr. Barnes, of Exeter, in England. Now such formations could only have proceeded from an inverted integument or enlarged cutaneous follicle, which amounts to the same thing, in fact. All surgeons attribute the horny growths, which have occasionally appeared from the time of the ox-fronted Emperor of China, down to the present day, to an epithelial condensation and induration of the scaly cells on the interior of a cutaneous follicle, enlarged and finally burst open by the projection of the growing scab. The first authentic portrait in existence is that of the Emperor Fou-Ki, "*la tête de bœuf*," who lived in the year B. C. 3468, according to Pauthier, and had a short pair of horns projecting from each side of his os frontis, precisely like those we now occasionally see growing up from a diseased sebaceous follicle of the same region. Mr. Cooper's case of a horn growing from the nates of an elderly gentleman was, however, the oddest case of this disease on record. Encysted tumors, containing hairs, are sometimes found in inferior animals. In sheep they contain wool, and in birds, feathers. If a hedgehog were to be thus affected, his internal parts would prove to be shot by an insatiate internal archer.

I do not believe that teeth have ever been found in simple cysts in any part of the body. The cases where they were met with must have been compound encysted tumors belonging to the cystoid class of Müller. They are described as having been found lying between folds or different layers of the cysts, or in amorphous masses attached to the sides of the cysts. Meckel says of the growth of both hair and teeth in abnormal situations, that "they are formed in the same way as in their natural situations: the teeth have their covering of enamel, and are formed in follicles." The hairs, therefore, may grow in inverted portions of the external skin, but the teeth can only form in compound cysts, like the fœtal tooth sacs of the jaws compounded with pulp and its membranes.

cellular cysts underneath the skin, but few epithelium cells are thrown off from the interior of the sac so as to be mixed with its contents, and the contents are always more fluid, and analogous to that of the serous membranes. In the follicular cysts, on the contrary, there is always a great abundance of these cells, which frequently occasion layers like false lining membranes of the sac, and which sometimes deceive the operator into the idea that he has taken out the true sac before he has really brought it into view. There is a more consistent and fatty-like secretion also, composed of a mixture of putrid scales, and very offensive butyrin and butyric acid, mingled with plates of cholesterine. The odor of the contents, and, indeed, the appearance of these, very closely resemble the offensive collections which form under overgrown and neglected toe nails of filthy and negligent persons. In truth, the same incessant exfoliation of epithelium scales and secretions of putrefying sebaceous and acid matters takes place in both situations, and affords the strongest possible countenance to Sir Astley Cooper's original idea of the production of this class of encysted tumors. Many of these sacs are found, after extirpation, to contain numerous small and short white hairs, like the fine down of the nearest portions of the outer skin, and these are intimately mixed with the soft or atheromatous pulp which some authors have compared to boiled groats. This is the variety which was always denominated *atheroma*, but it differs from the other forms of follicular cyst, merely because it grows below a different portion of the integument. In fact, the condition of the outer skin always modifies the contents of the subjacent tumor. Where coarse and strong hairs grow on the outside, we may expect occasionally to find the same formations below in accidentally developed follicular cysts, and the same may be said of every other external production.

Melicerous tumors are always found to be closely shut serous sacs, morbidly developed in the cellular tissue, and they differ from hygromas, or serous cysts, merely in containing a more viscous and honey-like secretion. This modification may have proceeded from a higher degree of inflammation having accompanied the first development of the cyst, or from the blood having been at that period more charged with albumen or coagulating lymph. The hale or healthy contents of common serous cysts are often discolored by a bloody admixture from recent contusions, or by a dark and coffee-ground, or wine-lees appearance, from the alteration of color, which

old effusions of the red globules may have produced from subsequent changes. Occasionally the color becomes greenish, or brown, like bilious or rhubarb infusions from the same cause. In some rare cases the contents have even been black or inky from some unknown chemical reaction upon the effused red globules, or probably from a direct secretion of the black pigmentous matter. Sometimes the effused blood, after severe injuries, gradually infiltrates through the external envelops by exosmosis, and stains the outer surface, as in cases of hæmatocele. These varieties should never be mistaken for genuine hematomes or blood-cysts, of which we shall speak under a separate head. Nor should they be confounded with bursal integuments of the vaginal or spherical sacs, which naturally secrete synovia and defend the tendons, ligaments, and other movable and prominent parts from friction. The means of discrimination between them and these latter conditions are, however, sometimes very obscure, especially in factitious or unnatural bursæ developed in unusual points, or over prominent surfaces, to protect them from the influence of the pressure.* Enlarged bursæ in deep situated parts, even where their position is definite,

* I have twice cut down for the extirpation of what, in consultation with others, I supposed to be troublesome encysted tumors over the tuberosity of the ischium on one side, and they both proved to be enlarged artificial bursæ containing a synovial fluid, one of them bloody from previous contusion, and the other viscous or gelatinous, like calves'-foot jelly. I once met with the same affection on extirpating what had appeared to be a common cyst on the throat, between the left extremity of the os hyoides and the contiguous corner of the thyroid cartilage. A large artificial bursa sometimes forms at the great sciatic notch, and may easily be mistaken for an encysted tumor emerging from the pelvis. The case related by Mr. South of a medical student in Paris, from whose buttock Dupuytren cut out the point of a sabre from a "defined swelling," filled with "a quantity of glairy fluid," three years after the reception of a wound in that region, was, no doubt, a case of this kind. I once had a piece of a broken neck of a champagne bottle lodged in this same synovial sac, which had been forced into it from a fall, and after the wound had healed up externally, the glass was extracted from just such a glairy cavity over the sciatic notch. It is possible, however, that foreign bodies may become encysted in other parts besides the natural bursæ, and still be surrounded with serous or glairy secretions. Nature may set up the barrier of an artificial bursa anywhere around a foreign body, to protect the surrounding parts from irritation, exactly as she often forms the same kind of sacs over any prominent part subject to unnatural pressure. I have repeatedly extracted foreign bodies that had been for a long time encysted in the common cellular tissue, and found a small quantity of serous or glairy fluid discharge along with them.

will often cause great confusion in this respect. It is sometimes very difficult to distinguish between a dropsical bursa of the psoas magnus and iliacus tendon, as it passes over the body of the pubis, and an encysted tumor in the same region. The same thing may be said of the bursa at the lower ischiatic notch, where the obturator internus tendon winds around the bone, and emerges from the pelvis between the gemelli muscles; also of the bursæ in the ham, and sometimes about the hip and shoulder joints.

The formation of simple *serous cysts* has generally been attributed to some modification undergone by the common cellular tissue. One of its cells is supposed to become occluded from the surrounding ones, or several adjacent ones must have been thrown open into one common cavity, into which the natural halitus or exhalation increases to a dropsical extent. The interior finally forms a species of epithelium, modified either like the serous or synovial surfaces, but never, in all probability, like a cutaneous or mucous surface. The opinion of Horne and of Hunter is certainly unfounded, that they can ever be converted into a substance like the true skin, so as to secrete scales and hair. Losing "the stimulus of being an internal part," and receiving "the same impression from their contents as the skin does from its external situation," can never convert one of these sacs into a real skin like that of the external surface. Such suggestions were made before Sir Astley Cooper's views upon follicular growths had ever been published or conceived of by the profession. Still, however, we are compelled to admit the high authority of Vogel in favor of the possibility of such formations entirely below the cutaneous substance. He gives engraved plates of fibrous sacs lined with a thickened pavement or tesselated epithelium, and containing fatty matter and exfoliated cells and corpuscles, exactly like follicular cysts. He does not say, however, how deeply they were situated, and probably they were merely cutaneous sacs after all. Certainly it is not common to meet with them, except in immediate contact with the under surface of the skin. The doctrine once so strongly advocated by Mr. Adams, of their being possessed of the properties of the lowest species of animals, i. e., hydatids, is now universally abandoned.* The only

* Hydatids do unquestionably sometimes occur in the human body, but their formation is almost universally confined to the cavities and internal passages. I once found the tunica vaginalis on one side filled with a mass of them, which case I at first mistook for a large hydrocele. All the others which I have seen

explanation which has ever appeared to prove at all satisfactory to medical minds, is, that they arise from a peculiar modification of the filaments and lamellæ of the cellular substance arising frequently from unknown causes, but terminating generally in an epithelial lining and a fibrous condensation of the surrounding non-elastic fibres. But this is only stating the facts in the order of their occurrence; it leaves us just as much in the dark in respect to the causes and origin of the disease as before the first discovery of formative cells. "Encysted tumors," says Chelius, "are to be considered consequences of an unnatural formative effort, of which the proximate cause is, in most cases, not to be determined."

When these simple cysts are congenital, as they frequently are about the forehead and orbit of the eye, especially at the angles of the superciliæ, they are situated underneath the subcutaneous muscles and fascia. They always maintain a strong adhesion to the periosteum, and frequently cause the absorption of a deep pit in the bone below. In some rare cases the entire thickness of the bone has been absorbed down to the very dura mater, from the long continued pressure of the cyst. The cyst becomes fibrous and dense in these cases, and requires early and complete extirpation. When these tumors occur in the neck they are called hydroceles of the neck, or adventitious sacs, and they often become important matters of inquiry, because they are apt to be mistaken for bronchoceles, or aneurisms, or glandular tumors of the deep-seated parts. They always lie beneath the sterno-mastoideus and mylo-hyoideus and

have been expelled or extracted from the uterus or bladder. Mr. South details one which he met with in the neck of a boy six years old, above the clavicle, and just between the mastoid and trapezius muscles. But there was only one small cyst which escaped from a larger cavity in that region. No doubt many cases of doubled or multiplied encysted tumors and cystoid tumors have been mistaken for hydatids by different surgeons. Formerly, such little blebs as are found in the choroid plexus of the brain, and other parts of the body, were confounded with these parasitical animals. In some rare cases, however, cysts very like true hydatids have actually formed in the medullary cavities of the long bones, and of the lower jaw bone, and have created so great a waste of the solid substance as to eventuate in incurable fractures. The large cysts which are generally found in large fibrous and fibro-cartilaginous tumors at the lower portion of the occiput and back of the neck, are certainly nothing but cystoid formations, probably developed in the bursæ, around which the fibrous masses grow as they extend down below and among the deep-seated muscles there. Their contents are always glairy or honey-like, such as diseased bursæ generally form under chronic inflammation.

their associated fasciæ, and become serious causes of distress and apprehension to the patient. When they become very large, they are usually thin and serous like, and can easily be palliated by occasional tapping with a trochar and canula.* Indeed, they may afterwards be

* A most interesting case of the so-called *hydrocele of the neck* presented itself to the author, about four years ago, in the person of Mr. T—, of Kentucky. The disease had commenced many years before, and during the last two preceding his arrival here, had increased so rapidly as to cause considerable deformity, and to interfere somewhat with respiration and deglutition. The tumor gave the appearance of a uniform œdematous-like enlargement of all the parts adjoining the thyroid body. The skin pitted under pressure, and an indistinct feeling of fluctuation was communicated to the fingers of each hand when pressed upon the opposite sides of the enlarged space. It was pronounced to be a cyst, containing a watery fluid; and an exploratory puncture was made by introducing a narrow bistoury over the edge of the sterno mastoid-muscle. At least a pint of a thick greenish serous fluid, tinged with blood, escaped; and an injection into the sac of warm water brought away a number of albuminous flakes through the aperture which was then closed. Two days after the operation, the wound had united, but the sac had filled up to its former size, and seemed to be much inflamed, whilst the difficulty of breathing had increased. During the whole of the succeeding week, he had much pain and uneasiness in the part, and suffered from severe, and even alarming, constitutional irritation. At the end of that time, however, more distinct fluctuation being perceived on the side opposite to the former puncture, a free incision let out a quantity of bloody serum, to the great and immediate relief of the dangerous symptoms. From this time, he continued to improve rapidly, and free suppuration throughout the sac resulted in its complete obliteration.

He returned to Philadelphia within the last year, and, upon an examination, the parts were found to be still somewhat enlarged and indurated—but there was no return of the fluid collection. Frictions of iodine ointment, with repeated leechings, and a long course of alteratives, almost entirely removed this induration, which was nothing more than the remains of the closed sac, and restored his neck to nearly its natural shape.

The above case, where puncture and a simple injection of warm water caused dangerous symptoms, illustrates so strongly the necessity of extreme caution in inflaming sacs in this region, that I have given it from my own memoranda somewhat at length. But, as cases of this description are so often mistaken in their character, and confounded with true bronchocele, or goître, (as was the tumor of Mr. T— by many who had examined him,) and so slightly are they mentioned by surgical writers, that I will quote, in addition, a note of the author, from his edition of Eberle's practice. In speaking of the use of setons, as proposed by some, in bronchocele, he says:—

"The seton sometimes produces excessive inflammation of the tumor, and has been followed by fatal results. It is chiefly in cases of *hydro-bronchocele*, or *hydrocele of the neck*, that setons and stimulating injections have proved serviceable. I have met with more decided success, however, from free incisions, and

excited to an obliteration or closure by the use of stimulating injections of iodine or dilute nitrate of silver, as happens in common hydrocele of the scrotum.* But when they are of small or moderate size, and situated low down the neck and close beside the trachea, they are always firm, and composed of a very dense fibrous sac which will not collapse after puncture. They are also then always filled with a dark or bilious-looking or viscous fluid, and frequently contain granular masses projecting into them from the thyroid gland, to which they firmly adhere. These are cystoid instead of simple encysted tumors, and sometimes require the severe, and in that situation, hazardous operation of extirpation.

Cystoid Tumors.

There are, according to Müller and Vogel, a great variety, and we should be very much perplexed if we were to adopt all the nomenclature that has been devised by them. In general, we may abridge most that has been written, and certainly lay down all that will be likely to occur in an extensive practice under the two divisions of cystic sarcoma. 1. Sarcomatous tumors containing cysts within their proper substance; and 2d, cysts containing sarcomatous and other productions within their proper cavities. We often meet

the subsequent introduction of lunar caustic into the cavity of these cysts, so as to excite discharges of pus, and the growth of granulations. I have repeatedly extirpated large tumors, both encysted and sarcomatous, from the thyroid, with success. In one case I removed the entire enlarged gland, and saved the patient from suffocation thereby. When the gland is merely hypertrophied, we may reasonably expect to disperse the swelling by judicious treatment perseveringly employed. But surgical remedies will be required when any actual disorganization has taken place. The diagnosis is always sufficiently easy. The experienced practitioner will not confound the hard, irregular, lobulated masses, which are the result of degenerations of the thyroid gland, with the smooth and uniform rounded tumors, unaccompanied with any change in the color of the skin, and in which mere fleshy hypertrophia is perceptible."—Ed.

* Deep seated cysts in the orbits of the eyes are generally thin and serous, or glairy, and may be treated in the same way. There is too much danger of injuring the functions of the organ or its appendages, to allow us to make a dissection deep enough to dissect away an entire sac in many cases. If the sac cannot be wrenched out after its superficial aspect is exposed and laid open, it is then best to cut off the projecting part and stimulate the cavity by an application of lunar caustic or tincture of iodine. A simple puncture, followed by the introduction of a probe dipped in the tincture of iodine, will often effect an obliteration of the sac.

with the first of these in sarcomatous enlargements of the female mammæ and of the male testis, as well as in the ovaria, both in the innocent and malignant forms of disease. Sometimes these internal or contained cysts are single, or if multiplied, uncomplicated with each other or anything else; at other times they exist in the form of labyrinths, sinual communications with each other respectively throughout the whole sarcomatous mass, and occasionally the individual cavities or cysts contain fleshy or amorphous solid masses, or internal cysts within their cavities floating in a serous liquid. Sometimes single cystoid tumors occur in various parts of the body, containing solid formations floating in a fluid. These contents are sometimes the result of inspissation and induration, or deposition from the contained secretion; and sometimes they proceed from a direct vascular and organized growth from the interior of the sac itself. Sometimes these internal productions grow from a narrow pedicle from the inner surface of the sac, and float in the liquor filling the general cavity like a fœtus within the liquor amnii.*

* I once extirpated a tumor from the inside or cleft of the buttock of a middle aged man. It was about the size of a pullet's egg, and proved to be cystoid, with a firm fibrous sac, including a serous fluid, in which floated a firm vascular and fibrous body of about the size and shape of a large frost or Lima bean. To the umbilicus or eye of this bean-like looking substance passed a narrow and twisted radicle from a point on the interior of the sac. This pedicle was about two-thirds of an inch long, and resembled almost precisely the look and form of an umbilical cord. This preparation excited great attention for a long time among us, and was aptly compared, by some of my pupils, to a miniature fœtus in the male subject.

On another occasion, I extirpated, from the person of a distinguished gentleman from N. C., a tumor from the inside of the ramus of the ischium, of the size of a turkey's egg, which was composed of a firm fibrous cyst, containing a brown fluid and a pyriform vascular tumor, the neck of which was attached to the inner verge of the bone, and received a large branch from the internal pudic artery.

In another patient the same kind of cystoid tumor was taken from the axilla, with an inclosed fibrous tumor of globular shape, and of the size of a small egg. All of these cases did well, and never returned afterwards, and were supposed by me, at the time, to be non-malignant tumors. The cystoid tumors complicated with sarcoma, however, whether within or outside the solid growth, are generally malignant in their character, and are allied to medullary fungus. Certainly in one case of a fibrous cyst, in the left mamma of a highly intelligent and healthy-looking lady, the wife of an eminent physician here, which I extirpated after a previous opening of the sac and fruitless injections of stimulating washes to excite a closure of it, the disease returned in the form of a true medullary growth. The tumor was extirpated a second and even a third time,

There is, in fact, hardly any end to the diversity of these cystoid formations, but we must refer to the works of Müller, and Hodgkin, and Vogel, for fuller special details.

Sarcomatous Tumors.

All fleshy tumors which are uncomplicated with bony growths or fluid cysts around them, are called sarcomatous by most surgeons. Several species of them are simple or non-malignant, while others, like the cerebriform and scirrhous formations in general, are highly malignant in their character. We will proceed to speak first of the simple species of sarcoma.

I. *Adipose sarcoma*, or *fatty tumors*, called, also, by some, *lipomatous*. Of these there are two leading varieties, 1st, the *circumscribed*, or *encysted*, composed from "an increased and altered vegetation of the first and second orders of the mucous bags" of Schreger, and "situated between the two plates of cellular expansion beneath the skin." These are situated more deeply than the other variety, altogether below the panniculus adiposus, and are always possessed of a well defined boundary. They have "a greater mobility, more elastic hardness, and a proper cellular cyst, which is commonly so firmly connected with the fat, that they can hardly be distinguished." This variety consists of "spherical masses of fat which differ from the natural fat, nearly resembling a slice through the brain or through a lymphatic gland, without cavities or partitions."

2d. The variety of adipose sarcoma which belongs to the *panniculus adiposus*, and is situated within it, presents no defined boundary, but appears to be composed of an increased development of the common fat, accumulated at certain points, and gradually merging into the surrounding adipose tissue. "The fat lies under the generally thinned corion, no general sac exists, and some parts only are enclosed in thin and simple walls." Vogel regards the last variety as a mere local hypertrophy; while he considers the former as the true lipoma.

and the last return of the disease, in conjunction with repeated attacks of erysipelas, destroyed her life. The original fibrous cyst was found to be lined throughout with a soft and granular red fleshy mass, although it had originally contained a bloody serous fluid in its centre.

Fig. 2.

Microscopic appearance of lipoma—(from Vogel)—160 diameters. *a*. Fibres forming the groundwork of substance of the tumors identical with those of ordinary areolar tissue, and between the fibres the fat cells. *b*. Corresponding with those in common adipose tissues. *c*. Drops of oil squeezed out of fat cells by the pressure of the glass placed over the object.

Although such tumors generally have a flat or broad basis, they sometimes become pendulous, especially about the neck and head. They then elongate themselves from a narrow pedicle, and sometimes attain an enormous size and weight.

Müller has described other varieties of fatty tumors, among which the most important is the *cholesteatoma*, which is disposed in layers of opalescent or pearly shining fat, in polyhedric cells, of an amorphous appearance to the naked eye, and without any lobular structure. The tumor is of the consistence of cold suet, or tallow, is surrounded by a very thin diaphanous membrane, and is destitute of blood-vessels.*

Von Walther has described a congenital variety, which is closely

* Miller and other recent authors describe cholesteatomata as being often pendulous, projecting from the external surface by a narrow neck, and Müller says the cholesterine is often secreted on the surfaces of old sores. Here is a case in point. Some years ago, I was called down to Milford, in Delaware, to visit the late Col. P——, then confined to his bed with a singular complication of diseases. He had strictures in the urethra and rectum, stone in the bladder, with diseased prostate, and incipient cataracts in his eyes, besides two large malignant and ulcerated lupuses on his cheeks. But the worst of all his afflictions proceeded from a pendulous white or pearly-looking tumor, about two inches long, which hung down from the posterior half arch of his soft palate on the left side, and fell upon the top of the larynx. This kept up a constant sense

attached to the skin, like a *nævus maternus*, and is covered by long coarse hairs. Sometimes the surface over them is dusky, or copper colored, so as very closely to resemble an enlarged nævus. We occasionally meet with this variety, which, although very small at birth, grows, in a few years, to such size as to require extirpation. The *lipoma arborescens* of Müller is occasionally met with in our practice, and extends over a large surface, in the form of nodules, attached to each other by slender branches or prolongations.*

The general rule adopted by surgeons, is to let such tumors, if they remain stationary, of a small size, and are not in an inconvenient situation, alone. They often remain for years without causing any distress; indeed, often for life. In all cases, however, where they give trouble to the dress, or motions of the patient, and especially when they threaten enlargement from rapid growth, it is our duty

of suffocation and difficulty of deglutition. The poor old gentleman could never repose, not even for an instant, in the recumbent posture. He had to be propped up on pillows, with the left side of his head and neck downwards, so as to prevent the tumor from falling by gravity into his larynx. I excised the tumor with immediate relief to his most troublesome and dangerous symptoms, by means of a hook and blunt-pointed bistoury. It had a narrow pedicle, and was pyriform in shape, resembling, very closely, a single large pearl glass pendule of the ear-ring sometimes worn by females in vulgar life. It was entirely destitute of vessels, and covered with a very thin transparent membrane. The firm and lamellated cholesterine of which it was composed, looked precisely like opal or iridescent pearl, as it hung within the throat. This was a genuine cholesteatoma. He had large indolent ulcers on his legs, both of which were also covered with a thick coat of shining white cholesterine, evidently of the same character as the contents of the pendulous sac in the throat.

* Last year I extirpated a very large *lipoma arborescens* from the neck and thorax of Mr. D., a celebrated French engineer, at the Columbia house, in this city. The largest portion of the irregular mass was situated below the adipose fascia of the neck, above the clavicle, and between the mastoid and trapezius muscles, but one prolongation extended backwards, and another downwards across the clavicle, to which it firmly adhered, to attach itself to another large and irregular fatty mass on the surface of the pectoralis major. The patient did well, although I had to make a very extensive and irregular wound, and check an uncommon degree of hemorrhage for that kind of growth. This is the variety of adipose sarcoma which Liston and others have spoken of as insinuating itself deep down between the muscles and large vessels and nerves, and proving difficult of extirpation. I once met with a case extending deeply below the clavicle and underneath the trapezius muscle and acromion process. In another case, an irregular process of fat lobules extended from below the jaw above the mylo-hyoideus muscle, and along the course of the duct of Wharton to the apex of the tongue.

to extirpate them. The operation usually proves very simple, and free from all danger. The only precaution required, is to lay open the cyst very fully, when one is found to exist, and then turn out the mass of the tumor by the handle of the knife. Very little dissection will be required after such a commencement, and generally no considerable hemorrhage ever follows. In cases of diffused lipoma, it is sometimes difficult to avoid free and complete incisions all around; but when once the swelling has been fairly circumscribed, it can easily be lifted up, and wrenched away without much dissection. Care should always be taken to apply firm pressure over the compresses after the dressing, so as to keep down the surrounding prominent masses of fat, and maintain the cavity of the wound in a state of perfect closure. Sometimes the tumor will return in spite of the most free incisions and extensive dissections. This circumstance has been attributed to the habit of leaving the surrounding attached and condensed cellular texture, which may reproduce the bulky deposition; but it is more likely that such apparent returns of the disease occur in the second variety we have described, from the operation being necessarily then only partially successful in removing the whole of the undefined mass of fat.

Although the skin over fatty tumors is not likely to ulcerate, still, the substance of very large ones may become inflamed from contusions, or other mechanical injuries, and generate deep and offensive ulcerations, which become protracted into fistulas, discharging an oily puriform matter. Such ulcerations generally refuse to heal, and we are then compelled to resort to an operation for the radical cure of the tumor. When the subcutaneous veins have become varicose, or greatly enlarged, we must take pains during the operation to protect them from regurgitation of blood by the aid of gravity, and also from the entrance of atmospheric air. A steady assistant should be ready to make pressure with his fingers upon the large trunks around as soon as they are divided by the knife; and pains should be taken in the dressing to prevent the danger of a secondary venous hemorrhage from obstruction of their trunks above. Fatty tumors sometimes become converted into fibrous ones, from an inflammatory deposition of coagulating lymph, and a subsequent organization of it into fibrous, or fibrinous tissue, within the substance of the fatty mass. They also degenerate occasionally, although rarely, into scirrhous or medullary tumors, from a deposition of malignant matter within their interstices.

II. *Fibrous Tumor.*—The next species of simple sarcomatous growth is the fibrous tumor of authors, and is composed of a yellowish-white, fibrous, or fleshy mass. It is called, by some, the cellular or fibro-cellular tumor, especially when it is elastic, and almost fluctuating to the touch. It is composed of condensed cellular texture and fibres, free from fat, the exhalation in the interstices being like that of the common cellular membrane. When it is more vascular than usual, it is called "common vascular sarcoma," or "simple fleshy tumor." When it is composed of "dense fibrous and ligamentary tissues, irregularly interlaced, and containing fibrinous matter, also of great density in the interstices," it is very apt to be mistaken for a cartilaginous tumor. Some authors have attempted to get over the difficulty of a rigid classification by calling such modifications of this variety *fibro-cartilaginous tumors.* Indeed, before the publication of Müller's great work, the profession were ignorant of the extent or frequency of occurrence of this species of growth; and often mistook it for others of a very different constitution, merely because it assumed some of their external qualities. Chemical analyses and microscopic researches have lately proved that a great number of cases which were once thought to be scirrhous, or cartilaginous, or osteo-sarcomatous, are really composed of condensed fibrine of the blood, sometimes partially altered into albumen or gelatin. When they have become very large, portions of them frequently soften down by a kind of degeneration, and become converted into a pulpy or puriform matter, sometimes mixed with grumous portions of blood. The undecayed portions of the mass will still look "smooth and shining, like a compact polished white tissue" to the naked eye; but, under the microscope, the whole will be found to be composed of small fibres, white or yellowish, like the elastic ligamentous substance.* When they occur in the uterus,

* Since writing the above description of this class of tumors, I met with the following case in the London Lancet of February, 1847, communicated by Mr. Ward, from Mr. Adams, to the Pathological Society of London. As it will serve to convey a clear idea of the kind of fibrous tumor which has frequently been mistaken in this city for enchondroma, and even sometimes for an osteo-sarcoma, I will transcribe it. "*Fibrous tumor of the jaw.*—The preparation, accompanied with a drawing, was exhibited. The tumor, with the portion of the jaw complicated in the disease, was removed by Mr. Adams, from a healthy man, aged twenty-four, who first complained of a toothache five or six years ago, for the relief of which a molar tooth was extracted at the time. About twelve months afterwards a substance was observed growing from the part originally

where the genuine firm fibrous tumor is most frequently presented, their fibres appear, under the microscope, precisely like the natural fibres of the substance of the organ itself. Müller divides them into tendinous and albuminoid fibrous tumors—the former are fully formed, and, on boiling, yield gelatin; the latter are either not fully developed, or consist of simple muscular fibre, and, on boiling, yield no gelatin. Valentin has proved that the elementary matter of the fibrous tumors, in the uterus at least, is coagulated fibrin, and not albumen, as others had supposed. The fibres probably differ, however, in their composition in different cases, and sometimes even in different parts of the same tumor. They are intimately mixed with the areolar tissue, which we know is composed both of elastic fibrinous filaments, and of non-elastic tendinous ones. Vogel asserts that the chemical as well as histological relations of fibrous tumors "present many differences. The perfect fibrous tumor yields gelatin, analogous to that of areolar tissue (colla), while, from those consisting of simple interlaced muscular fibre, no gelatin is yielded on boiling. Neither by boiling can we obtain gelatin from the fibrous tumors which are yet undergoing development, and are amorphous."

These tumors are located in a greater diversity of places than any other kind, for they may originate wherever the cellular and fibrous tissues abound. They even form in the substance of the skin. The hypertrophies of natural skin, and especially of cicatrices, are always varieties which, at first, become denser as they grow larger, until

occupied by the tooth, and which continued to increase in size until two years ago, when he placed himself under the care of a practitioner in the country, who removed the tumor by the application of the cautery and caustic. It soon, however, grew again, and continued to increase until his admission into the London Hospital, two months ago. The tumor had then attained the size of a small orange, and appeared to spring up between the plates of the bone close to its base, the plates being separated so that there was a considerable bulge externally, and protrusion into the mouth, in the form of a large lobulated mass, highly vascular. It occupied the left side of the lower jaw, from near the symphysis to the angle. The man was well in ten days after the operation. The tumor was found to be of a simple fibrous character, and had evidently sprung from the cancelli near the base of the jaw; it presented a beautifully striated appearance, the striæ passing in a vertical direction. Its free surface was impressed with the crowns of the molar teeth of the upper jaw. It had gradually thinned out the lamellæ of the bone, which, in some parts, was reduced to a mere shell. *The fibrous arrangement of the tumor was well represented in the drawing.*"

finally they may ulcerate, and soften from mere disintegration. After Alibert, Dr. Warren has called the cutaneous variety *Keloides*, a name which other authors have since adopted. A particular description of this variety, in all its forms, is comprised in his excellent "*Surgical Observations on Tumors;*" a work which deserves the careful attention of every member of our profession, as embodying the great experience of one of the most successful operators and practitioners of the day. Vogel ranks warts and condylomata, and polypi (meaning dense fibrous cutaneous lumps, and polypi, of course), among them. The subcutaneous tubercle is another variety, occurring in the common cellular tissue, and sometimes in the subcutaneous nerves and fasciæ. They arise upon the periosteal and perichondrial membranes,* and sometimes in the interior of the bones, especially of the jaws; in the muscular coat of the intestinal canal, especially of the stomach, and particularly at the pylorus.† They frequently occur in the ovaries and in the uterus, and in the general cavities of the abdomen and chest. They also arise from both fibrous membranes of the skull, and very frequently on the pericranial investment of the tuberosities of the occiput. Vogel asserts that they are always modified by the law of analogous formation, and that when they arise in parts where "the areolar tis-

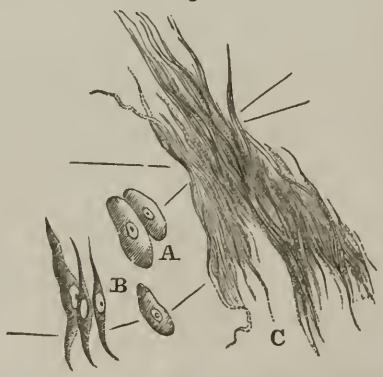
* There can be no doubt that many of the cases which have been published as osteo-sarcoma of the bones have been simple indurated fibrous tumors of the periosteum or perichondrium. I am now conscious that I repeatedly made the same mistake in the early years of my practice.

† The dense fibrous tumors of the hollow viscera are generally mistaken for true scirrhus of those parts. I have no doubt but the reported cases of scirrhus of the pylorus, as well as those of the fundus uteri, have almost always been simple indurated fibrinous varieties of this tumor. The microscope will generally prove them to be so, notwithstanding their apparent cartilaginous or scirrhous hardness. In many cases I have distinctly traced the pale fibrinous filaments through the whole mass of such tumors by the naked eye, when others had pronounced them to be carcinomatous. I once made a post-mortem of a little boy, seven months old, (with Dr. Bacon, of Spruce St.,) who had been afflicted with obstinate vomiting and marasmus from his birth. We found an apparent scirrhosity of the pylorus, of the size of a walnut, which accounted for his symptoms. But it was not a scirrhus. It was evidently fibrous, and composed of a homologous growth, or hypertrophy of the non-striated muscular fibres of the pylorus. The same thing occurred in the person of an old gentleman in Bucks County some years ago, who died after long obstruction from a hard tumor in the epigastrium, with hiccuping and vomiting of black coffee grounds. I found the tumor, which occupied the pylorus, wholly fibrous in its structure, although as large as my doubled fist.

sue prevails, they consist principally of more or less fully developed fibres of areolar tissue; whilst tumors consisting of simple muscular fibre are only found in those parts which consist in the normal condition of simple muscular fibre."

Their formation is universally attributed to the organization of preternaturally effused coagulating lymph. Mr. Lawrence and Vogel corroborate Hunter's opinion that extravasations of blood can be directly organized into the same kind of formations. But the majority of pathologists believe that the coagulum undergoes a gradual absorption, while fresh lymph is at the same time effused around it, and actually becomes the matrix or blastema of the preternatural growth. Certainly injuries of every kind which are competent to produce either bloody effusions, or depositions of lymph among the interstices of the living parts, can give origin to fibrous tumors. The only question is, whether the nucleated cell corpuscles, subsequently located in the affected blastema, organize it into a new growth, or the old-fashioned coagulating lymph converts itself into a formation analogous to that of the surrounding parts by virtue of its own inherent and plastic powers. Upon this point we cannot avoid remarking that, when the lymph coagulates, it always resolves itself, in some measure, directly into fibres, interlacing each other in various directions, among the interstices of which the microscope always detects numerous small corpuscles, or nuclei of cells. These infi-

Fig. 3.



The microscopic appearance of a fibrous tumor, showing interlacing fibres (C). Primary cells with nuclei and nucleoli (A), and the same cells elongated and becoming caudate (B). (Vogel.)

nitely small fibres appear like the ultimate filaments of the non-striated muscular tissues, and may always be collected in larger

masses by stirring or whipping the fresh drawn blood with a stick or bundle of rods. Now it is much more probable that the cells contribute to aid the subsequent efforts at organization among these interlacing fibres, than that they originally form them by elongating their capsules into caudated cells, or nucleated filaments. In their earliest stage of formation, they must be soft and pulpy like the recently formed polypi from fibrinous effusions in the nostrils and throat, and then gradually become indurated and fibrous. When they arrive at a very large size, they sometimes contain a variety of heterologous depositions—such as cartilaginous points and bony plates, or spiculæ. Although in their original state they are always homologous and non-malignant, they may finally become degenerated, and even, in some instances, malignant. When they become pendulous from loose parts of the body, as from the head, neck, and scrotum, they sometimes grow to an enormous size, like pendulous fatty tumors. They have been known to weigh from thirty to fifty pounds in some rare cases. In hot climates, particularly in China, they not unfrequently increase to such enormous dimensions.

Mr. Liston has spoken very sensibly of an immense variety of non-malignant tumors, which cannot be classified under any distinct head, and which certainly are not homologous with any one of the natural structures. "Some are composed of a homogeneous substance, of almost cartilaginous consistence, and a whitish color; some consist of cartilaginous matter, mixed with substances of less density, and of a different appearance; in some, fibrous matter is mixed with a homogeneous, glandular-looking substance, partially softened. Some are almost entirely composed of osseous matter; others contain it in small proportion. It would be endless to enter into a minute detail of the structure of such tumors, for it may be said that their appearances vary with their number. In almost all tumors, cysts are found, and the internal structure of some tumors consists almost entirely of cysts, or hydatids, as they have been called; in others, those only occupy certain parts, and compose but a minor feature in the structure. The sacs are generally lined with a delicate and smooth membrane, which is often vascular at various points; some contain a transparent and glairy fluid, albuminous, or gelatinous; some bloody serum; some purulent; some curdy matter, or this mixed with a serous or purulent fluid; some pure blood; some a fluid like printer's ink; and not a few are occupied by a dense elastic substance, which, on a section being made

of the tumor, rises irregularly and ragged above the cut surface. Some tumors are smooth, others lobular or tuberculated." This description of the varieties and complications of non-malignant fibrous tumors, although strong, is by no means overdrawn. Every practical surgeon of any experience must recognize the principal details, and concede to Mr. Liston the credit of rivaling even John Bell himself, in the true graphic style of description in surgery.* Vogel has entered into a full and minute detail of all the complications and causes of these perplexities in this species of tumor, which it is impossible to do full justice to in our short limits. It will, perhaps, be sufficient to state that he enumerates the greater or less vascularity, the smaller or larger proportion of cellular and non-striated fibres; the various degrees of fatty, and cartilaginous, and osseous complications; and the more or less perfect development of organization in the primitive amorphous blastema, as the principal causes of these varieties. He goes on further, also, to explain the occasional transition of those tumors into the compound cystoid, and into the malignant epigeneses; all of which circumstances will go sufficiently far to explain many of the perplexities and difficulties of this department of surgical observation. They will, at least, serve to convince some practitioners that many of the supposed cases of malignant tumors which they have cured by their operations, may have only been instances of such complicated and almost unintelligible structures, as are now arranged under the head of modified fibrous growths.†

* This was, of course, written some time before the death of that eminent surgeon, for whose surgical character, both as a writer and an operator, the author always entertained the highest respect and esteem. Little did he think, however, whilst penning these expressions of admiration, that before they could reach the printer, both would be so suddenly cut off, in the midst of their career of usefulness.—Ed.

† On a careful review and minute inspection of the collection of morbid tumors in my museum, I am now perfectly satisfied that a great majority of the preparations which I at first suspected to be of a malignant character, but which did not return at any period after their extirpation, belonged to some of these varieties or modifications of the fibrous class of tumors. One case, in particular, of firm, medullary-looking conversion of the entire mamma extracted from a Creole woman from Jamaica, about twenty years ago, and which contained several compound cysts, or cystoids, communicating with each other respectively, is evidently fibrous, mixed with an amorphous blastema, which contains the cysts. Although it was supposed to be medullary, or encephaloid, at the time of the operation, the woman continued to remain in perfect health for

Cartilaginous Tumors, or Enchondromata of Müller.

As we have already observed, dense fibrous tumors have been frequently mistaken for cartilaginous growths; but since the researches of Müller were published, we have been enabled to point out the difference between these affections both by means of the

twelve years before she escaped my notice, and during all that period presented no symptom of a return of the disease. Another case of an enormous, pulpy, and elastic enlargement of the left mamma in a maiden lady of Penn Township, was extirpated with a terrible hemorrhage and prostration. The tumor weighed full four pounds, and was loaded with soft, and brain-like looking matter. The disease has never returned, and it is now nine years since the operation. On a careful examination, the whole mass appears evidently cellular and fibrous, with the interstices chiefly filled with partly organized lymph, or blastema. Several of my tumors of the parotid and sub-maxillary glands also are chiefly fibrous, or compound fibrinous in their character, and did not return. When large tumors of this sort begin to degenerate in their interior into soft and medullary-looking pulp, they are not necessarily malignant, although they are commonly thought to be so by surgeons. It is in the cases of tumors which are originally morbid, or malignant from the start, that I always dread a return of the disease.

[It may not be amiss to claim here for the author, the credit of having done more than any other surgeon, by the number and success of his operations, to completely establish, as safe and feasible, the extirpation of the *Parotid Gland*.

In tracing back the records of surgery, we find, prior to his first operation, in 1826, several isolated cases which prove that among the earlier surgeons, even as far back as the celebrated Hiester, of whom Bordeu, in his "Researches" on the Glands, page 56, remarks, in speaking of the parotid—"On ne peut s'empêcher d'admirer l'adresse, et le courage de Hiester, qui est dit avoir emporté toute cette gland"—there were some bold enough to attempt this really formidable operation, and to consider its successful execution not only within the bounds of probability, but of reason and security.

Still, at that period, their authenticity was not only questioned by the majority of the profession, but the many dangerous anatomical obstacles involved, as well as the deep and almost inaccessible situation of the gland, rendered its removal at least so serious an undertaking, that it was laid down by most authors as extremely hazardous, and even characterized in the strong language of John Bell, as "impossible and absurd."

The case of Beclard, but a year or two before, having terminated fatally, did much at that time to prejudice opinion against the operation. Cases which have since been reported as having been performed previously, were not then made known; and, on the whole, as regards boldness in entering upon a new and scarcely explored field of surgery, the first case of the author may be considered as almost an original one. There was then no record of the difficulties and complications of this operation; nothing laid down to guide the adventurer as to the dangers likely to be met with in his progress through an untried region;

microscope and the simpler methods of chemical analysis, and now find that real cartilaginous formations are much rarer than was formerly supposed, but still they occasionally occur. The most common development of cartilaginous new-growth (or epigenesis), is in

and the very case first undertaken by him, had been previously attempted and given up by eminent surgeons abroad. The accumulated experience of European and American surgeons has now, however, completely demonstrated its practicability, and we may safely, though there is still high and distinguished authority in this city opposed to it, place it among the standard and established operations of surgery.

The parotid gland has now been repeatedly removed by various surgeons of this city, throughout the country, and in Europe. But no one has done as much to effect the change of opinion regarding the operation, as the author. As to the number and success of his cases, I will quote his own words from a manuscript letter now before me, which was written within two years.

"I have extirpated *eleven entire parotids*, in various conditions of organic disease, and only *one* of my patients died in consequence of the operation. That unfortunate case was the late Mr. Meuse, of Rocky Mount, Virginia, who sank under coma in the fourth day after the operation, from the effect of the ligature around the common carotid artery. The other ten patients recovered, and seven of them are still alive and well, in different States of the Union. Only one of these, Mr. Ashman, of Ohio, died from a return of the disease, in the same part, three years after recovery from the operation.

"The next case which occurred to me I turned over to my son, who successfully removed, in the presence of a large number of medical friends, an enormous tumor, involving the whole parotid, an immense mass of lymphatic glands extending down the neck, with the common carotid artery, the internal jugular vein, the par vagum, spinal accessory, and portio dura nerves. That patient, George Andrews, of Washington, Pa., went home in four weeks with the wound entirely healed."

In addition to the cases above-mentioned, the author removed, in the long course of his practice, a very great variety of tumors from the same region which involved portions of the parotid. These generally commence in the lymphatic glands over its surface, and extending downwards and inwards, either cause absorption of its superficial portion, or embrace it in the disease. They may lie deep, but not being completely within the confined pyramidal space, where the main body of the gland is imbedded, and not involving the portio dura, or the external carotid, are comparatively easy in their removal. Indeed, he enumerated to me over thirty different cases of the kind; but only considered the *eleven* operations stated in the extract from his letter, as comprising the *entire gland*. Tumors of this description are often mistaken and described as involving the whole gland, and many of those which occurred to the author, were thought by others to comprise its entire substance.

The true test of its complete removal, besides the depth and extent of the wound, and the relation to the external carotid, is the total paralysis of the parts supplied by the portio dura, the muscular branch of the seventh pair of nerves.

the form of hypertrophies and extraordinary growth of bones, as in cases of periosteal exostoses and callus. But such are only growths in a state of transition, and they gradually pass on to the formation of complete bone. When they form independently of the bones or

Its function must always be destroyed by the removal of the gland, and in all the cases which I have seen, six besides my own, this has invariably been the result. The whole side of the face was paralyzed, and the patient unable to *close* the eyelids of the side affected, whilst he could readily *open* them, the orbicularis palpebrarum being supplied by the portio dura, whilst the levator derives its muscular power from the third pair, or motor oculi.

With regard to the external carotid artery, the author generally secured it in the course of the operation, as it was found entering the tumor, and did not deem it necessary to apply a ligature at an earlier stage. The precaution mentioned by Dr. Warren, of having an assistant ready to make pressure upon the common carotid in case of its division, was always found to check the hemorrhage until the vessel could be secured. When the tumor, however, is of a very large size, and extends to the neighboring parts below and behind, and involves the glands over the sheath of the great vessels, it may be necessary to tie the primitive carotid. This was the case with several of the author's operations, and, in one, he was obliged to secure it some time after the operation for a secondary hemorrhage from the internal carotid, (as mentioned in the note at the bottom of p. 186.) As the ligation of this artery greatly adds to the risks of the operation, it should always be avoided if possible.

Many particulars of interest connected with this operation might be given from the number of cases I have witnessed; but I find I have already overstepped the limits I had intended devoting to it. My only object in here referring to it, is to place before the profession the author's claims as to experience and success in this operation.

I will, however, add several cases which may be found interesting.

"In the spring of 1826, Dr. M'Clellan, Professor of Surgery in Jefferson College, successfully extirpated the whole parotid gland, affected with scirrhous enlargement. The patient was an intelligent young surgeon from Europe, and the swelling was so enormous that the whole left side of the face was considerably distorted. On examining the parts, it was found that there was a large and irregular cicatrix over the most prominent surface of the tumor, which proceeded from an ineffectual attempt, previously made by an eminent surgeon of Dublin, to extirpate the diseased gland. As the patient was incessantly harassed with the most excruciating pain, and suffered constantly from a very troublesome chronic inflammation of the left eye, in consequence of an inability to close the eyelids, Dr. M'Clellan was at length prevailed upon to make an attempt to extract the tumor, and thus afford the unhappy sufferer the only chance of relief.

"The operation was commenced by making two curvilinear incisions, extending from a short distance above the zygoma to within about two inches and a half below the angle of the lower jaw. The integuments were then raised from the surface of the tumor, and an incision was made down upon the zygoma and masseter muscle before, and upon the cartilaginous tube of the ear and mas-

in distinct situations, and in permanent masses, they alone deserve the name of *enchondromata* originally given to them by Müller. The occurrence of this form of morbid growth among the soft parts, independent of its connection with the bone, is very rare, and is

toid process behind. Being unable to dissect further in either of these directions, Dr. M'Clellan immediately proceeded to burrow under the lower extremity of the mass. In endeavoring to accomplish this part of the operation, he was necessarily obliged to divide the posterior belly of the digastric muscle; after which the fingers were at once admitted under the whole body of the tumor, so as to enable him to make effectual efforts to wrench it from its bed. Before he proceeded farther, however, he insulated the continued trunk of the external carotid, just as it was entering the tumor, together with the descending veins, which accompanied it, and instead of cutting them across in the usual manner, he tore them out from the body of the tumor, with the thumb and fore finger. The operator's face and eyes were instantaneously deluged with a gush of blood; but before he could recover himself sufficiently to cast a ligature around the vessels, which he still commanded with his fingers, the hemorrhage had completely ceased. After powerful and repeated efforts at wrenching, and by an occasional use of the knife, to divide the strong bands of cellular substance, and some of the fibres of the styloid muscles, which adhered to the tumor, he finally succeeded in elevating the whole mass above the mastoid process and ramus of the lower jaw. The trunk of the portio dura, very much enlarged in consequence of the previous irritation, was then seen emerging from under the mastoid process, and mounting over the posterior margin of the tumor, to enter its substance near the anterior surface. The unnatural state of tension in which this nerve was then placed, produced such an agonizing degree of pain that the patient was thrown into convulsions and syncope. These, however, speedily disappeared on dividing the nerve; in doing which the cells of the conjunctiva were instantaneously injected with extravasated blood. The operation was then completed by separating the upper portion of the tumor from the zygoma, which was effected by the scalpel, inasmuch as the layers of fascia were too strong to be lacerated. In this last step of the operation, Dr. M'Clellan was necessarily compelled to cut the main trunk of the temporal artery; and this was immediately secured with a ligature, the only one employed during the operation.

"On examining the cavity of the wound, it appeared much larger at the bottom than at the surface; and its depth was at least four inches and a half from the skin to the walls of the pharynx, which was largely exposed at the bottom of the wound. The styloid process, entirely denuded, and even divested of a large proportion of its muscular fibres, which had been torn away with the tumor, projected into the postero-inferior part of the wound. The internal carotid and jugular vein, together with the hypo-glossal nerve, which were barely covered with some loose cellular tissue, formed the posterior parietes of the deep and expanded part of the cavity that was situated within the ramus of the jaw before, and the mastoid process behind. With a finger, introduced behind the ramus and angle of the jaw, could be felt the two pterygoïdei muscles, which were completely exposed, and projected into the cavity in that situation. In

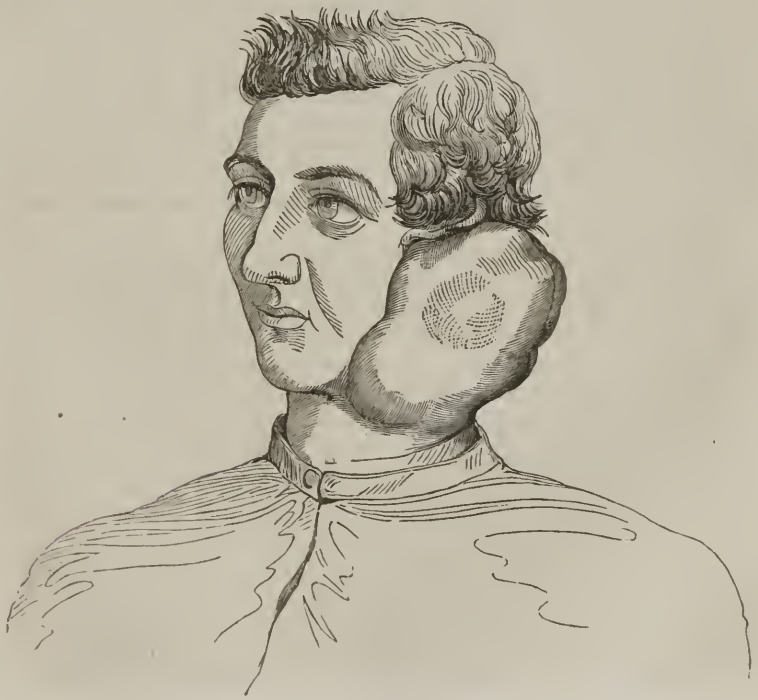
chiefly confined to the glands in the parotid, the submaxillary, the mammary, the seminiferous, and, in very rare instances, the lymphatic and mesenteric glands or ganglia. Although the natural or normal cartilage, and also all the unnatural or abnormal growths upon or

fact, the tumor appeared to have projected into, and to have filled up every space into which the parotid itself could possibly have insinuated; and no vestige of any portion of that gland, either sound or morbid, could be discovered in any part of the exposed cavity. The lips of the wound were brought together with interrupted sutures, and a few strips of adhesive plaster, and the patient, although his sufferings were extremely great, finally completely recovered."—Extracted from Prof. Gross's notes to "*Tavernier's Operative Surgery.*"—This patient is still living, and lately resided in the city of New York.

The following case, mentioned by the author, as having been performed by myself, he intended inserting at length with the accompanying cut. Independently of the large size of the tumor, it presents the important fact of the division of the pneumogastric nerve without any injurious effect upon the patient.

In the end of April, 1845, Geo. Andrews, of Washington, Pa., about 28 years of age, visited this city for the purpose of having removed an immense tumor of the parotid region. The tumor involved not only the entire left parotid gland, but all the parts in its immediate neighborhood. As imperfectly shown in the

Fig. 4.



within the bone are so prone to the development of bony matter as a regular accompaniment, this variety of enchondromata is distinguished by containing no bony particles or plates either as a covering or interior deposition. The fibrous or condensed cellular tissue which in-

drawing, it elevated the ear and almost doubled it upon itself, and extending from above the zygoma, downwards to the lymphatic glands over the sheath of the great vessels, reached to within an inch and a half of the clavicle. Anteriorly it overlapped the greater portion of the masseter muscle, and projecting some distance from the side of the neck, passed backwards as far as the transverse processes of the upper cervical vertebra. The upper portion of the sterno-mastoid appeared to be entirely obliterated, whilst below it was inserted into the side of the lower portion of the tumor. This enormous mass was soft and yielding in the central and more prominent lobes, whilst the base and edges were of a much firmer consistence, and presented all the characteristics of a once firm tumor rapidly degenerating into genuine medullary or encephaloid disease. Its daily increasing size, the great impediment to the motions of the jaw and throat, as well as the severe pain occasionally felt, determined the patient upon the removal of the tumor, as the only prospect of escape from a speedy and otherwise inevitable death. On these grounds the operation was decided upon, and was accordingly performed on May 2d, in the presence of Drs. Geo. McClellan, P. B. Goddard, S. G. Morton, Bacon, and several others.

It was commenced by making a V like incision, so as to free it from the ear, from the extremities of which two elliptical incisions were continued down the whole length of the tumor, meeting at the bottom and thence prolonged, so as to command the common carotid artery. This vessel, from the extent of the parts involved, it was necessary to secure. It was found, with some little difficulty, being displaced from its usual position by the great distortion of the parts. The internal jugular was here wanting, and in the progress of the operation proved to have been entirely obliterated by the pressure of the tumor.

After dividing the attachments of the sterno-mastoid muscle, which, as before mentioned, firmly bound down its lower portion, and cutting through the posterior belly of the digastricus, it was, as in the preceding case, by strong and repeated efforts, wrenched upwards from its bed. The firm bands of cellular texture which confined it below were next separated, more by the fingers and handle of the knife than with its cutting surface, and in doing this the par vagum, spinal accessory and portio dura nerves, which were involved in the tumor, were necessarily divided. The upper portion was then carefully dissected from the cartilaginous part of the meatus auditorius, to which it was closely adherent, and being separated from the zygoma, with a few more efforts the whole mass, along with the sub-maxillary gland, came out entire.

There was very little hemorrhage frem the recurrent circulation, and during the operation but two or three small vessels besides the main trunk were tied. The cavity was truly enormous, showing completely the bare walls of the space occupied by the parotid and submaxillary glands, and exposing the sides of the pharynx, the styloid process, denuded of its muscles, and the transverse

tervenes between its cartilage cells, or rather forms the matrix in which they are deposited, also consists in general of a more amorphous and apparently unorganized cellular substance than natural, so that the whole mass closely resembles true cartilage. In fibro-cartilaginous growths the regular organization of the fibrous tissue can always be clearly made out, and constitutes a large proportion of the mass. In simple fibrous tumors no true cartilage cells can be detected by the microscope, notwithstanding the dense impaction of the fibres may deceive the naked eye.

The vascularity of genuine enchondroma, especially in this isolated form, is very low, and hence the growth of such tumors is exceedingly slow, and apparently non-malignant. Indeed, the opinion of the German surgeons appears to be conclusive that it is never malignant in its nature. Some constitutions are, however, peculiarly liable to it, and appear to be possessed of a cartilaginous diathesis. Even young children sometimes present instances of it in various parts of their bodies. It sometimes returns also after being freely excised.

Inasmuch as the law of analogous formation does not prevail in these isolated growths of cartilaginous matter as it does when they occur on or within the bones, it is impossible to explain the disposition to such an organization of the effused lymph, or blastema, except we resort to a constitutional predisposition. Now such a predisposition necessarily involves one of the most unfortunate points of character in malignant diseases,—a tendency to reproduction after repeated removals. But we must admit that the enchondromata do not assume the other and more dangerous traits of malignant growths; they never call the surrounding parts into the same mode of diseased action, nor do they affect the constitution with irritative excitement or depression. Vogel states that they are non-malignant and unaccompanied by pain, and are so slow in their development, that they often exist and increase for ten or twenty years, attaining

processes of several cervical vertebra, while it extended down nearly to the clavicle where the great vessels had lain. After the first shock of the operation, the patient had but little constitutional irritation, suffering chiefly from tenderness of the pharynx whilst swallowing. The ligature around the primitive carotid came away on the twelfth day, and the whole extent of the wound had filled up and healed at the end of the month, when he returned to his home.

He was heard of as doing well some months after, but an indirect report of the return of the disease has since reached me; which, however, from the nature of the tumor, was almost anticipated.—Ed.]

a considerable size without materially incommoding the patient. Gluge described a tumor of this kind, which, on extirpation, weighed nine pounds and a half. They may, however, when large, like the other more malignant tumors, inflame and ulcerate, and become dangerous from the quantity of discharge.

The enchondromata, which affect the bones, arise, as we have already observed, in two situations; 1st, in the interior of the cylindrical, and 2d, on the exterior of the flat,* as well as of the long

* One remarkable case occurred to me, about eight years ago, of an enchondroma in the interior of a flat bone. The Hon. Mr. Allen, of Cleveland, Ohio, then a member of the U. S. Congress, brought his son to me, a fine lad, of about seven years of age, with a broad swelling in his left temple, which had been for eighteen months gradually enlarging, and attended with a troublesome determination of blood to the head. It had been pronounced an incipient exostosis of the skull by some distinguished practitioners in other cities, and the little fellow was brought to me to undergo an operation. On a careful examination, I found a gradual rising of the external table of the lower portion of the parietal bone over a large circular space, of about two and a half inches in diameter, with a prominent and elastic portion in the centre as large as a twenty-five cent piece. This was destitute of a covering from the external table of the skull, and felt like a fibro-cartilaginous tumor with three peculiar fixed and hard lumps in its substance, which I compared to round-headed nails standing up through the elastic mass from the firm internal table below. As the disease was then making progress, and threatened the integrity of the cerebral powers, I consented to the wishes of the parents, and undertook the operation. After dissecting away the angles of a triangular or T-like incision, and exploring the pericranium, I revealed the surface of the fibrous mass as it was exposed in the centre of the swelling, from which the entire substance of the external table had been removed by absorption. I then made a circular incision around the whole circumference of the tumor through the external table, with a small circular Hey's saw, and pryed away the bony crust included within this circle by an elevator. On dissecting up the flat and firm tumor which was then exposed from the internal table of the bone below, I had to saw off the three bony knots or studs I have alluded to, from the internal table. The whole tumor was then fully detached, and proved to be chiefly fibrous with cartilaginous deposits among all the interstices. The three knobs were eburneous or ivory-like exostoses, and the whole substance of the exposed tabula vitrea at the bottom of the wound proved to be composed of radiated or stellated fibres of eburneous and shining spicula. I therefore carefully cut through these by the gentle application of a small Hey's saw, and raised and completely detached them from the dura mater below by the forceps and elevator. The main branch of the middle temporal or meningeal artery bled freely, and I was obliged to secure it with a fine ligature. The flaps were then reapplied, and contracted speedy adhesion to the dura mater, and the little fellow left town for his home in three weeks, with a soft pulsating space in the situation of the wound, but with no symptom of inconvenience. The disease has not returned, and I hear that so much ossific

bones. Central enchondroma of the bones appears, according to Müller and Vogel, more frequently than any other form of the disease. Although our experience in this country by no means corresponds with this opinion, still the descriptions of Müller have so often been corroborated in our practice, that we do not hesitate to subscribe to their accuracy in the main. We must confess, however, that before we had read the translation and reviews of his original publication, we had repeatedly mistaken cases of this form of the disease for spina ventosa and malignant osteo-sarcomata. It appears most frequently in the metacarpal and metatarsal bones, and in the phalanges of the hand and foot, in the form of rounded smooth tumors of various sizes, and encased in a vesicular expanded bony shell, or case. The bony crust becomes eventually thin, and in some places altogether disappears, leaving the periosteum above to encase the tumor. A section of the whole mass reveals a soft cartilaginous substance, enclosed in and among cellular and fibrous interstices. Small spiculæ of bone are generally interspersed throughout the cartilaginous mass. Sometimes the cartilage is softened down into a gelatinous matter as if partially dissolved in boiling water.

External, or peripheral enchondroma of the bones is developed underneath the periosteum, and on the outer surface of the true

matter has been re-deposited below the scalp as to suppress the pulsations there completely.

All the other real enchondromatous and fibrous tumors, which I have met with on the flat bones, have commenced on the external surface underneath the periosteum, although several of them have eventually penetrated entirely through the whole bony substance, and appeared on the opposite sides of the bones. This has especially been the case on the scapula and os ilii. I have twice made *post-mortem* examinations of enormous enchondromas, which commenced on the internal surface at the costa of the ileum, and projected through the bone behind in a large bulging mass, at the same time that they occupied large spaces in the cavity of the abdomen. On the ribs I have seen the same tumors extend around the whole circumference, and bulge inwards against the pleura as well as outwards underneath the pectoral muscles. In the first case in which I operated for a removal of a tumor from the antrum, as early as the year 1821, the swelling commenced on the outer surface of the *os malæ*, and gradually extended forward over the periosteum of the superior maxillary bone until it sunk inwards into the antrum, and backwards into the zygomatic fossa. The whole outer and posterior wall of the antrum had to be removed along with the malar bone, and full half of the zygoma. The tumor was supposed at the time to be a fibro-cartilage, but it is now evidently enchondromatous.

bone. Its form is more irregular, its surface being generally rendered uneven and rugged by separate and distinct small cartilaginous nodules of various sizes. The internal structure closely resembles that of the former variety of enchondroma, small portions of bone being likewise occasionally found between the cellular fibres and the cartilage cells. This affection occurs more frequently on the flat bones than around the cylindrical ones. It frequently sinks down into, and even penetrates through, the entire substance of the affected bone, so as to expand to an immense extent on both sides. Cases have occurred under our observation, where it increased to an enormous mass, containing softened-down portions like jelly, and serous cysts in the interior. When the latter phenomenon is present, the diseased formation passes into the group of cystoid growths, and is generally confounded with the indisputable malignant diseases. In their chemical relations, enchondromatous tumors differ somewhat according to their consistence and duration. The firm and indurated enchondromas of the bones generally resemble ordinary cartilage of the bones in their composition by yielding chondrin on boiling, while the soft and independent formations yield colla, or ordinary gelatin. But these differences are not so clearly made out to correspond with any external physical signs as to become the foundation of a distinct classification.* Nor is the

* There is no doubt, in my mind, that the reviewers and commentators on Müller's first publication, placed too great stress upon the difference between the various kinds of cartilaginous tumors, according as they yield colla or chondrin on boiling. Müller himself states, in his Physiology, that "it is remarkable that the cartilage of bone before ossification yields only chondrin when boiled, but after ossification it affords the ordinary gelatin (or colla); at least such is the result of my observations." Some of the natural cartilages with all the tendons yield colla, while a majority of the cartilages and ligaments yield chondrin. Müller lays down four different kinds of normal cartilage in the human body, all of which differ from each other in respect to their chemical modification in regard to chondrin and gelatin, although their physical properties are so much alike.

In the *gelatinous tumors* described by Müller, either the cartilaginous substance has been gradually softened down by a species of ramollissement, (as often occurs in the progress of large tumors,) or there is a secretion of mucus and pyin into the distended interstices of the mass. Müller has described a very rare form of this gelatinous deposit under the name of *collenoma*, "a remarkably soft gelatiniform tissue, which trembles upon touching." It is not regarded as a malignant deposit, although it is occasionally intermingled with carcinomatous and medullary formations. I have seen it twice in the brain, and

external appearance of the tumor before its extirpation, and even after its interior exposure to the naked eye under the section of a knife, sufficient to enable us to classify it satisfactorily. Although the interlacing and interstitial fibres increase in many cases in their proportion over the cartilaginous deposits in their cellular interstices, so as to constitute a compound fibro-cartilaginous tumor, many of these, which are so firm and solid as to present an entire cartilaginous aspect, consist wholly of a more or less condensed fibrous tissue, and contain no cartilaginous matter in their cells. Nothing but a microscopic examination, accompanied with a direct chemical analysis, can, at all times, enable us to make a perfect diagnosis. Fortunately, however, such a discrimination is of no great practical importance to the surgeon, since both forms of tumor appear to exercise a very similar action upon the human organism. Both of them, in all their varieties, are liable to degeneration and softening-down of structure in their latter stages, and may then readily be confounded with malignant growths. The ramollissement of such tumors very closely resembles medullary fungus in its appearance, and may, in some cases, partake of its nature.

OSSEOUS TUMORS.

Isolated bony tumors, existing independently of the natural bones, are still more rare than the same order of independent cartilaginous growths. Although small nodules and spiculæ are very rarely found by themselves, they not unfrequently occur in the interior of sarcomatous tumors, especially of the fibrous and fibro-cartilaginous kind. They are sometimes attached to the uterus and its appendages, and

at first mistook it for a variety of ramollissement. It is said to occur in the female breast, but I have only met with them in small interspaces within the substance of larger growths of other forms of disease. The most common form of this deposit is to be met with in the substance of large and malignant osteo-sarcomatous growths, especially of the extremities. I have seen from half a pint to three gills of it discharge in a gush, on laying open large osteo-sarcomatous tumors of the limbs after amputation. In such cases, however, this deposit has only been adventitious. The great mass of the tumors was always made up of medullary, or cartilaginous growths. When this substance predominates in the substance of a tumor, Müller denominates it *colloid* or *gelatinous cancer*, and I dare not venture to assert that it is not, under such circumstances, different from any of the degenerated or softened-down portions of the solid masses.

even to the heart. But it is necessary in these cases to distinguish between the true and false, or merely *apparent* osseous growth. The former presents all the chemical and histological peculiarities of true bone; the latter consists of an unorganized deposition of calcareous salts between the various elementary tissues, and belongs to the class of *concretions* instead of the ossifications. Most of the so termed ossifications, including those which occur in tumors of the lymphatic and mesenteric and bronchial glands, and in the arteries, belong also to this class, and are not true bony structures. To the former belong the formations which, though unconnected with the normal lesion, occasionally occur in the fibrous membranes, as the dura mater and aponeuroses, in tendons, and very rarely in the coats of the eye. Mr. Miller, in his late excellent work, denominates the latter class the *calcareous tumor*, and speaks of it as occurring in the parotid gland. "The tumor is superficial, loose, painless, hard, of slow growth, and small size; its surface is generally unequal. It is inconvenient simply by its bulk and position, and has but little tendency to degenerate. Absorption, however, is hopeless, and early removal is expedient. From the circumscribed form, small size, and slightness of adhesion, the dissection is easy; little more than simple incision is required." From this quotation it is evident that the author means nothing more than that the primary excretory ducts in the substance of the parotid are liable to the same stony concretions that are sometimes met with in the large duct of Steno itself, and in the ducts of Wharton, and also in the ramifications of the ducts in the substance of the submaxillary and sublingual glands.

When true bony structure is developed in any part remote from a natural bone, it is impossible to account for the proximate cause, the same difficulty occurring to our inquiries, as we have confessed in cases of the independent growth of cartilage. When, however, bony matter is thrown out anywhere in direct connection with the normal structures of the same kind, we have the comfort of being able to recognize the law of analogous formation by way of explanation. Simple osseous tumors, whether independently existing, or in association with the natural bones, are invariably non-malignant. But there are several forms of composite enlargement and disease of the bones which are highly morbid and malignant in their character, to which we will have to direct our attention under the head of malignant tumors. Here comes in one of the greatest

difficulties in the classification of tumors; but we will avoid all minute disquisition upon the subject by confining our attention at present to such tumors of the bone merely as are non-malignant.

Exostosis.

The term exostosis has been frequently applied too vaguely by authors, so as to include almost every kind of bony enlargement. Some have comprehended under it fibrous tumors, enchondroma, osteo-sarcoma, and spina ventosa, and even medullary growths. By all careful and judicious writers the term now, however, is meant to designate merely those simple enlargements of true bony matter which cause solid tumors to appear on some one of the surfaces or prominences of a regular bone. There are two kinds of these which we meet with in our practice. The first is the eberneous or dense ivory-like exostosis, and the other is the common cancellated exostosis. The first is smooth, shining, and polished precisely like ivory or pearl, and is solid throughout, with hardly a sufficient appearance of vessels or interstices to allow of an internal circulation. It usually appears on the flat bones, especially on the cranium, and more frequently than anywhere else on the superciliary ridges.* It is described by most authors as being generally small, and of very slow growth. This is, evidently, most analogous to the outer tables or layers of the firm bones, and has nothing like the cancellated or diploic structure within. The substance, however, is much more dense and pearl-like than any natural

* I have extirpated two small eburneous tumors from the superciliary ridge in different cases—one of the size of a hazel-nut, and the other of a full-sized hickory-nut, both of which projected downwards upon the globe of the eye. In both cases I had to remove the whole thickness of the outer wall of the frontal sinus along with the tumor; in only one of them, the largest, was the fibro-mucous membrane lining the sinus laid open. The edges of the incisions in the skin and occipito-frontalis muscles were brought together by twisted sutures, and healed over the breach without any difficulty. I excised with a long slender saw held in a tangent to the surface of the skull, a large eburneous tumor of the size of half a turkey's egg from the frontal protuberance of the person of Mr. C., of Wheeling, some seven years ago. The disease never returned, although several smaller ones of a similar character exist on other parts of his skull. I have met with two cases on the mastoid process and occipital angle of very large ones, which I dared not remove during life. It was difficult enough to saw one off after death.

portion of the outer surface of the natural bones. Coarse fibres and stellated rays of this kind of eburneous matter which some have compared to crystalizations, sometimes form upon the surface of the bones under the substance of adherent scirrhous and even of fibrous tumors. It would appear as if the bone had been contaminated in such cases by the character or malignancy of the tumor resting upon it, and as if it were absolutely necessary to remove the whole eburneous matter in order to get rid of the disease.*

The cancellated exostoses are of a more loose and spongy texture, and resemble exactly the entire structure of the bones from which they grow. The exterior crust is of the same dull white hue with the outer surface of the bone around or below, and never shining or eburneous like the former variety; its interior is hollowed out or

* I will state the case of Mr. Stoltz from Montgomery county, in illustration of this point. A firm scirrhous tumor had been excised from the left side of the vertex of his scalp by Dr. Harris, two years before he came to me. In the mean time the tumor had returned in increased size. It was hard, nodulated, dusky and painful. On a careful extirpation of it down to the very outer table (for the pericranium was thickened and homogeneous with the grisly substance of the tumor), the whole of the exposed bone was stellated in coarse, eburneous and radiating fibres, with bluish cartilage intermixed between these fibres. I could not make the wound cicatrize afterwards with any kind of dressing. The edges of the cut scalp would granulate soundly, but the bone commenced slowly to exfoliate and discharge fetid sanies. Finally I applied nitric acid repeatedly and destroyed the whole of the eburneous external table down to the diploe. Granulations then shot up, and the whole surface cicatrized. In another year he returned with a painful scirrhous tumor in one of the lymphatic ganglia just behind the posterior margin of the sterno-mastoideus muscle, as large as an egg. I extirpated this with the spinal accessory nerve which passed through its substance, and soon afterwards sent him home apparently well. Nevertheless, he returned in another year with an angry looking ulceration in the centre of the old cicatrix on his skull. This finally presented jagged and everted and elevated edges, and required repeated applications of caustic and narcotic ointments. It could never be made to cicatrize, however, and was repeatedly exasperated and increased in size under the care of my friends Drs. Lewis and Rex, until, finally, he died from an extension of the disease by contiguous sympathy down to the membranes of the brain.

The same crystalline or stellated ivory appearance is occasionally presented on the ribs and sternum after the extirpation of deep seated cancerous tumors about the mammæ, and always indicates a fatal return of the disease. If it be possible, the whole of this altered surface should be rasped or cut away from every bone which is exposed by the removal of suspicious tumors above or over it.

excavated into cells or cancelli, precisely like the natural bony structure, to allow of a free interior circulation. They are most commonly formed on the bones of the extremities, and their cancelli frequently communicate with those in the interior of the parent bone. Sometimes, however, they are shut out from such a communication by the original walls remaining unaltered from the new growth on their exterior. In the latter case, the exostosis appears to be altogether a new deposit on the outer surface of the original structure; while in the former, it would be easy to conclude that the tumor had been formed by an extension of all the layers of the bone itself. The disease sometimes originates without any assignable cause in the deep seated parts, as at the insertion of a tendon or ligament. But frequently it arises after a blow or some other injury. Inflammation, of no marked character, however, always accompanies the process. The injury does no more at first than to cause an effusion of coagulating lymph, which always serves as the blastema, into which vessels ramify as the cells form, and first convert it into cartilage underneath the periosteum, then the blood-vessels increase and shoot out in a radiated form, and deposit the osseous matter in the interstices exactly as in the formation of original bones. Sometimes the tumors form with a narrow neck or pedicle, and then they grow in the manner of an epiphysis, and are called *epigenic exostosis*. In such cases we can feel them yield and move a little at their necks during the early progress of their growth. More frequently, however, they have a hard and firmer attachment, and are of a cylindrical or irregular shape, often projecting in the form of a broad spicula, or fusiform eminence. When they project near the joints, or among the muscles and tendons of a limb, they often give origin to great inconvenience and even pain. They sometimes impede the functions of other important organs by pressing upon or displacing them. Their growth is always more rapid than that of the eburneous kind, and they generally grow to a much larger size. At all events they project more into, or among, the enveloping structures and organs, and more frequently require surgical operations for their removal.*

* It is by no means so often necessary to perform the operation for extirpating an exostosis as is generally supposed. By far the majority of cases become stationary after they have attained a moderate size, especially if the patient is kept on an antiphlogistic regimen, and attention be paid to his regular secretions and exhalations. Those who have been occasionally compelled to operate

There is another variety of this disease described by some of the continental authors of Europe, under the name of osteoma, or *parenchymatous exostosis*. This consists in an enlargement of a bone throughout its whole extent, or the greater part of it. This is generally of a more spongy or cellular structure than either of the other forms, but sometimes the substance of the bone is much thickened, and more solid than natural. This is a real hypertrophy of the bones, and hardly deserves to be ranked among the exostoses. The long bones of the extremities, and the lower jaw, are more frequently affected by it than any other part of the skeleton. Although antiphlogistics may sometimes be necessary to check the forming stage of this disease, and perhaps, in some rare instances, a trephine to evacuate purulent matter, or to remove caries, after a severe inflammation superadded from injury or subsequent disease, the idea of removing such general bony enlargements by the saw and cutting forceps is altogether absurd. Yet such operations, and even amputations, have been proposed by some writers. As Mr. Liston says, "they remain stationary after having attained a certain size, and are productive of little inconvenience, the surrounding parts having accommodated themselves to the new formation."

Spina Ventosa.

The next innocent or non-malignant tumor of the bones, in order of frequency of occurrence, is the spina ventosa, or windy tumor, so

for the removal of exostoses from deep-seated positions, where they interfere with important motions, or functions of any kind, know too well the difficulties and embarrassments to resort unnecessarily to a repetition of such attempts. I have seen patients suffer more from the extirpation of prominent and troublesome ledges of bone from the linea aspera than from any other surgical procedure, and afterwards undergo more local and general irritation as well as fever. I think I never was so much perplexed and worried as in an effort which I once successfully made to cut away a long and flat prominence from the inner fork of the linea aspera of the right thigh in a muscular young man, whose comfort and business had been much interfered with by the growth of the tumor. A large hook of the excrescence extended upwards along the inner side of the thigh directly over the femoral artery and vein, where they passed the adductor tendons, and rendered it very difficult to avoid them. The collateral vessels were also very greatly enlarged, and bled furiously under every stroke of the knife. A small narrow saw, however, finally enabled me to cut away the whole bony mass, and the patient recovered with severe inflammation and fever.

called from the appearance of the dried bony preparation after all the soft parts have been washed away by maceration. The thinned and expanded outer crust, and the largely dilated internal cells, or cancelli, look precisely as if the cavity had been blown up, while in a plastic state, by a forcible distention of wind. This bony en-

Fig. 5.

Bony preparation of spina ventosa—taken from the skull of the patient whose case is reported p. 348.

largement generally proceeds from a slow chronic internal inflammation of the cancelli,* and the whole cavity is filled by an interstitial infiltration into the distended cells, of pus or puriform matter. It more frequently, however, is occupied by a deposition of reddish-brown, spongy-looking granulations, mixed with bloody sanies, or ichorous sero-purulent matters. There is one variety which does not arise from injury or chronic inflammation, but is developed from the internal formation of cysts containing a serous or glairy fluid, and compared by some to hydatids. This form of the disease should, however, be considered as a variety of the cystoid growth within the cancelli of the bones, instead of the fibrous and cellular tissues of the soft parts.

* John Bell conceived that the whole substance of the original bone was dissolved and wasted away by an internal caries commencing in the cancelli, and producing the collection of morbid secretions within, while the distended and thickened periosteum was all along secreting new portions or plates of bone around, to make up for the loss of the internal structure.

There are other sources of distention or external enlargement of the bones, however, besides these three kinds of non-malignant fluid and pulpy collections which may present the same external appearances as spina ventosa. An internal enchondroma of a bone, or a fibrous tumor, occurring in the same situation, may produce the same kind of external dilatation and attenuation of the outer layer of the round, or tables of the flat bones. Malignant deposits of cerebriform, or true medullary fungus, moreover, and internal aneurismal growths of the minute vessels, in some of the forms of telangiectasis, may counterfeit the same appearance, and not reveal their true character until they have burst entirely through the external crust, and protruded their ruptured masses externally.

Fig. 6.*

* This plate was carefully drawn from the bust of a patient who underwent an operation for the removal of a large spina ventosa of the skull. The cicatrix of the tumor, as shown in the cut, represents very correctly its situation and relative size. This case is particularly mentioned by Mr. Combe, in his "Tour through the United States," as having in its results an important bearing upon phrenology, and, in his opinion, giving strong confirmation of its doctrines. But, what is more to the purpose, in the present instance, it is highly interesting

The most frequent seat of the true spina ventosa, or simple distention of a bone from an included collection of matter, or vascular and granulating pulp, is in the lower jaw, and in the metatarsal and

in a surgical point of view. It was one of several cases of the kind successfully operated upon by the author, and as I do not recollect seeing a similar one recorded elsewhere, I will transcribe it, at length, from his own description in the "American Phrenological Journal," for Jan. 1841.

"Early in the month of December, 1838, Thomas Richardson, a resident of the city of Pittsburgh, called on me for surgical aid. He was then twenty-two years of age, and had been afflicted about three years with a tumor upon the vertex of his skull. About six months before the first appearance of the tumor, he received a severe blow from a missile on the affected region, after which he occasionally experienced tenderness and pain there. As the tumor gradually increased, it produced a determination of blood to the head, attended with a sense of fullness and a giddiness on stooping. But he was not deprived of any intellectual power; nor were any of his sensations or muscular actions disturbed.

"The tumor was very hard and unyielding, and had been pronounced to be an *exostosis* by every surgeon who had examined it. It was oblong in shape, being four inches in the long, and three and one-fourth in the short diameter. It was raised in the centre about one and three-fourth inches above the surrounding portions of the outer table of the skull, and extended from about an inch beyond the sagittal suture on the right side obliquely to the left, and backwards over the adjacent portion of the left parietal bone. It occupied, phrenologically, the organs of Firmness, Self-esteem, Approbativeness, and a part of Cautiousness, on the left side.

"I was induced to undertake an operation for extirpating this tumor, chiefly because no symptoms of cerebral affection could be discovered other than those which a moderate determination of blood to the head might produce. Two long incisions were first made at right angles near the centre of the swelling, and afterwards the scalp was dissected up from the whole surface, and to some extent, around the sound bones. With a long narrow saw, held in a tangent to that portion of the circumference of the cranium, I then cut off the entire tumor, apparently at its base. The saw moved with difficulty while it was passing through the external table, but with great ease when it was acting upon the interior of the mass. This first led to the suspicion that the disease was not an *exostosis;* and when the prominence had been removed, it was made evident that a far worse state of things had to be encountered. The exposed surface presented perpendicular cells, or cavities, like those of a honeycomb, which were filled with a bloody, or pulpy and sanious matter. The case was at once decided to be a *spina ventosa* of the skull, and it was therefore deemed necessary to extract the whole mass from the surface of the dura mater beneath. A long and tedious extension of the operation was then undertaken. The whole mass of the tumor was circumscribed by the circular edge of a small Hey's saw, and the mass was pried out in successive fragments by an elevator, occasionally aided by the bone nippers and forceps. This part of the operation

metacarpal bones and phalanges of the fingers and toes. Mr. Liston speaks of an enormous one, of more than seven inches in diameter, in the lower part of the femur of a boy, of which the patient died,

proved exceedingly difficult, for the tumor extended inwards much deeper below the internal table, than its outer surface had risen above the external table of the skull. Finally, however, a removal of the whole morbid structure was effected, and the dura mater was exposed, thin and livid in appearance, at the bottom of a deep cavity which the bystanders estimated to be capable of holding four and one-half ounces of water. There were no pulsations visible, although the circulation was strong and full. Some small spiculæ of bone adhered to the dura mater, which were extracted by the aid of forceps. In extracting the last of these, which appeared to penetrate the dura mater, a prodigious gush of venous blood issued, after which the patient fell into a convulsive syncope. The hemorrhage was supposed to proceed from the longitudinal sinus, and was therefore arrested by graduated compresses and a bandage. The angles of the wound were brought as near together as possible over the compresses, for the purpose of affording support to them while they were confined by the bandages. Very little irritation resulted from this operation.

"In nine days, the compresses were loosened by suppuration, and on removing them, the whole of the exposed surface was found to be granulating, and the orifice in the great sinus was closed. But the brain had not risen up to occupy the exposed cavity; and it was found impossible to place the flaps of the scalp in contact with the dura mater in the usual way, so as to close the wound. Mild dressings of patent lint were applied over the surface, and confined with moderate pressure by means of a double headed roller. On the twelfth day after the operation, the cavity below the bone was evidently diminished, and every day thereafter it continued to decrease, until, in the fourth week, the surface of the brain covered by the granulating dura mater had risen up to the level of the inner table. The natural pulsatory motions did not appear, however, until the cavity was nearly filled; and, in the mean time, forcible pressure could be made on the surface of the brain without exciting any degree of stupor or inconvenience on the part of the patient. But as soon as the pulsations began to appear, every kind of pressure proved irritating to the brain. At the same time, a remarkable change took place in the character and bearing of the patient. He then became exceedingly timid and irresolute. It would render him pale and almost pulseless to approach him with a pair of scissors for the purpose of trimming away his hair from the margins of the wound; and the sight of a piece of lunar caustic, or a pair of forceps, in the surgeon's hands, would throw him into great trepidation. This state of his mental faculties continued for a long period after his complete recovery from the wound. He could not even go down into a cellar containing some plaster busts, without a sense of faintness and sinking; and the operation of taking a cast of his head in plaster, nearly prostrated all the functions of his mind and body. His carriage also became remarkably affected. Instead of maintaining his natural erect posture and bearing, he sunk his head and shoulders into an awkward stoop, and looked timidly and anxiously forward, as if he was afraid of blundering against a door-post.

because he would not submit to an amputation. "The parietes were composed of an extremely thin lamina of bone; and in this there were numerous deficiencies supplied by ligamentous matter; its

"At the time of the operation, and until the pulsations of the exposed portion of his brain returned, he was remarkable for his firmness of mind and resolution. No patient ever bore a severe and protracted operation with more intrepidity. He sat upright in a chair, without any confinement, until the blood-vessel gave way at the close of the operation; and during its performance, he repeatedly inquired of the bystanders if it was the brain which was coming out under the efforts of the surgeon. It has been, moreover, stated by those who have known him well for years, that previous to this injury he had always been distinguished for his firmness, courage, and independence.

"He is now (two years after the operation) living in perfect health at the Exchange Hotel, Pittsburgh. He is engaged in active business, and is entirely exempt from any symptom of a return of the disease. His former firmness and intrepidity of mind have been gradually returning for a year past, and at present no departure from a healthy condition of mind or body can be discovered. A thickening or induration of the flaps of the scalp, which resulted from their long exposure and separation from the subjacent dura mater, and which at one period gave origin to a report that the disease had reappeared, has become entirely softened down, and attenuated by the natural process of absorption.

"As this case occurred during the period of Mr. Combe's first course of lectures in Philadelphia, it excited great attention among all phrenologists. One of the gentlemen who attended the operation, addressed a letter to Mr. Combe, stating that both organs of Firmness were lost or destroyed; and asked for an explanation of the apparent contradiction in the conduct of the patient to the principles of phrenology. Mr. Combe read this letter publicly to his class, and endeavored to explain away the difficulty, by locating the position of the tumor posteriorly to the organs of Firmness. On a further, and subsequent examination of the wound, however, he decided that a great portion of the skull, over the region of Firmness, had been removed, together with that of several of the neighboring organs, as I have enumerated them.

"In no respect, however, does this case militate against the principles of phrenology. The organs, instead of being destroyed, were merely displaced or depressed by the growth of the tumor, in the same way that deformities are produced in some of the savage tribes by gradual pressure of the skull. Perhaps a better analogy may be drawn between the state of these organs and the parts of the brain pressed upon by internal effusions of blood, and depressed fractures, which do not produce the symptoms of compression. A compensation is then made for the space occupied by the effused blood or depressed bone, by a corresponding amount excluded from the cavity of the vessels, and retained in the general circulation.

"A careful examination of this case will, I think, elicit observations in suppor of phrenology. The tone and excitement of the depressed region of the brain must probably have been increased by the invasion of the tumor, on the same

cavity was divided into several compartments by thin septa, partly osseous, and partly membranous." He does not state with what the internal cells were filled, but as he had just before asserted that

principle that the muscles of laboring men are sometimes supported by leathern straps and bandages. On the other hand, the extirpation of the tumor must have had the same effect in removing the tension and mechanical support of the organs, as tapping for abdominal dropsy exerts upon the viscera of that great cavity. As soon as the depressed convolutions began to be unfolded or distended by the pulsation of the blood-vessels, they experienced a want of that pressure which had before stimulated them into an increase of activity. Their tone then became enfeebled, and continued so until the scalp had contracted adhesions to the outer surface of the dura mater, and the cicatrix became consolidated, so as to afford a firm and counteracting support to the pressure of the circulation below.

"While Mr. Richardson was recovering from the operation, he was visited by several phrenologists, for the purpose of establishing the precise location of the wound. Although they differed in their opinions in regard to the degree in which the organ of Firmness was involved, they all agreed that Self-esteem was affected, and some thought the injury extended also to the organ of Concentrativeness. Inquiries were therefore directed by them to the manifestations of these faculties; and the patient did suggest some points of character in relation to which he conceived he had undergone an alteration. He asserted that he had for a long time previous to the operation lost his self-respect in the presence of company, and his power of confining his mind to any particular train of thought. But these peculiarities were not obvious to me, or to any of his familiar friends; and I have not thought it right to put them down in my estimate of his condition, as affected by the operation. Such affections may have been the result of that confusion in the mind which generally accompanies excessive determination of blood to the head. It has been suggested that they were produced by a paralysis of those organs which were most severely depressed by the deepest portion of the tumor; while, at the same time, the convolutions which lay under the edges of the tumor, and were only slightly pressed upon by it, were stimulated into increased activity of their functions. I will leave the decision of this point, however, to more experienced phrenologists, trusting that the facts which I have here given, will be judged of according to their merits."

Among the many interesting operations of the author for the removal of spinæ ventosæ, were his cases of *exsection of the ribs.* This operation he performed in several instances for spina ventosa, osteo-sarcoma, and caries, with complete success. In the last and most extensive one, that of Mr. A. L. Martin, of Holly Springs, Mississippi, performed on June 15th, 1842, the patient died from bilious remittent fever nine weeks and four days after the operation, having so far recovered as to dress and walk into the adjoining room. The tumor involved the sixth and seventh ribs, on the right side, extending from their cartilages nearly to the dorsal vertebræ, and could not have been less than ten inches in its longest diameter. It projected externally at least four inches from the surface of the

" the contents of spina ventosa are always fluid, generally purulent, though often mixed with more liquid and dark-colored matter, or

ribs, and about the same distance within them, pushing behind it the pleura, and had almost destroyed the function of the lung by its encroachment. The tumor from presenting the characteristics described in the text, and from the result of an exploratory puncture, made the day before the operation, was pronounced to be a genuine spina ventosa, which was afterwards verified by its extirpation. Its removal was commenced by including its external portion within two elliptical incisions made in the direction of the ribs.

After separating the integuments, the sixth and seventh ribs were found involved in the tumor, their central portions being in a great measure destroyed by it, whilst their extremities projected at either side into its substance. These were removed by means of the chain saw and bone nippers, and the hand was at once admitted into the internal portion within and behind the ribs. The soft, pulpy contents of the tumor mingled with the expanded and puffed up bony fragments, were then rapidly scooped out by the hands, and being carefully detached from the pleura by the fingers and handle of the scalpel, its whole mass was removed.

The hemorrhage which, before the morbid surface was completely separated from the pleura, had been very considerable, was soon checked by the application of patent lint slightly moistened with creasote, and the operation was completed.

The cavity, as then apparent, was really enormous—the largest I have ever seen made upon the human body; without the slightest exaggeration, it would have admitted into it with ease, a child's head of the ordinary size at birth. It not only extended, as before described in length, but internally projected, both above and below, much beyond the two ribs involved, and exhibited the smooth and polished surface of the pleura costalis which had been separated from the ribs, and pressed back upon the lung in the advancement of the disease.

The patient, though much enfeebled from the operation, speedily recovered. The wound rapidly filled with granulations, and the lung which had been so much impeded in its office, gradually recovered its function; and rising so as to very much diminish the cavity, could be distinctly seen playing within the chest and performing the motions of respiration.

Everything now promised a speedy and effectual cure in this remarkable case. The patient had so far recovered his health and strength as to dress and walk into the adjoining room, and almost considering himself well, was making arrangements to leave in a few days for the sea coast, at Cape May, to escape the oppressive heat of the city; when, unfortunately, on the 25th of July, forty-one days after the operation, he was seized with a severe chill, the first premonitory symptom of the remittent bilious fever which afterwards destroyed him. He had been annually subject to these attacks of fever, and had, throughout his whole recovery, been dreading its occurrence; it assumed the worst form of the congestive fever of the south-west—rarely seen in this city—and only when, as was doubtless the case in this instance, the seeds of the disease had been brought with the patient from his home. On the 20th of August, nearly

with a curdy substance,"* he no doubt meant to convey the idea that similar fluids must have filled this very large tumor of the femur. It does not appear, however, that all other surgeons have been so careful in restricting the contents of the cellular structure in the interior of spina ventosa to fluid matters. Certainly many cases have been detailed as real ones of this disease where the interior was filled with soft red pulp, intermixed with bony filaments or pabula, such as must have resulted from the excessive distention and partial disintegration of the original fibres of the cancelli. The great diagnostical point appears to have been, that the tumor should not be malignant, and that nothing but sanious, or ichorous, or purulent fluids should discharge on the instantaneous bursting open of the tumor. If a fleshy or fungous substance protruded from the rents or orifices in the bony crust, it was called a case of osteo-sarcoma.

ten weeks after the operation, he died, and on an examination, the lung was found to have almost entirely resumed its natural situation, and the wound was nearly filled with granulations which had contracted and diminished its immense extent to a degree really surprising.

An operation very similar to Mr. Martin's case was performed by the author prior to 1836, upon Mr. John Uhler, of Lebanon, Pa. In this case the seventh and eighth ribs were removed, and the tumor projecting into the pleura, was about the size of a large orange.

The patient perfectly recovered, and within a year or two was heard of as still in good health.

I have given these cases perhaps more space than my limits permit of, but as they are extremely interesting and important, I might say unprecedented, it could not well be avoided. On a future occasion I hope to give to the profession fuller and more minute details of this and other species of operations performed by the author.—Ed.

* I find that Dr. Gibson, the distinguished Professor of Surgery in the University of Pennsylvania, in his chapter on spina ventosa, mentions "a substance resembling cheese" as filling the cells of spina ventosa. Such contents do actually form in scrofulous constitutions, mixed with spongy swellings of the phalanges of the fingers, as well as in the spongy cavities of many of the other bones. They are often cured by pressure and stimulating applications in addition to the general treatment appropriate for scrofula. I doubt, however, the propriety of arranging such cases under the head of spina ventosa. The thin steatomatous matter which Dr. Gibson speaks of as having occurred in Dr. Stevens' celebrated case of spina ventosa in the lower part of the radius, may have been the common glairy fluid, mixed with sanies, which is frequently found to discharge from this tumor.

Osteo-sarcoma.

This distinction between the fluid and fleshy, or solid contents of an expanded outer crust of bone, naturally leads us to speak, in the same connection, of osteo-sarcoma, which is certainly the most vague and indefinite in its application, of all the terms in surgery. As Mr. Cooper has well observed, "it is found to be a convenient name, because it suits any tumor which consists partly of bone, and partly of a soft or fleshy substance." Mr. Liston evidently means to restrict its application to soft, red and pultaceous fleshy masses, intermixed with bony cancelli, in the interior of a puffed-up bone. But other surgeons have extended it to all fleshy growths upon and within the bones. Thus we have cases of external or periosteal osteo-sarcoma; and those of internal or interstitial osteo-sarcoma, of every kind and description. Some have meant to characterize non-malignant growths upon and within the bones alone, by the use of this term; while others have applied it to every combination of bone and fleshy substance—the cystoid, medullary and carcinomatous growths included. We have, therefore, all the enchondromas in and about the body; the fibrous tumors; the indefinite, pulpy or sanious tumors; the lardaceous, or fatty tumors; the genuine medullary; the morbid vascular and the melanotic tumors of the bones, all comprehended under the same head. This, to be sure, would make no serious odds, were all surgeons to specify the characters of each individuul tumor, by affixing a specific or descriptive name in addition to the generic one. Thus periosteal tumors of the fibrous kind might be called "external fibrous osteo-sarcomas;" the same located tumors of the cartilaginous form "external enchondromatous osteo-sarcomas;" while the internally developed ones of the same kind might be accordingly characterized by substituting the appropriate prefix "internal." The steatomatous, the cystoid and the medullary growths might all be characterized in the same way; and thus all sources of confusion be obviated in the minds of intelligent readers. But, unfortunately, no such nicety or accuracy of classification has been observed; and we are compelled to forego the use of a great many published cases, and probably much that would otherwise turn out to be valuable matter, because we cannot satisfactorily make out what kind of disease the authors really meant to describe.

To interpret the cases as they now stand recorded in the various

journals and special treatises on surgery, it would appear most satisfactory to all readers, to restrict the term osteo-sarcoma to such non-malignant internal growths within the substance of a bone, as imitate the external appearance of true spina ventosa, and cannot be classified under any other head. We often meet with cases that, on an external inspection, first appear to be spina ventosa, but on laying them open, we discover soft and pulpy, red or fleshy contents, mixed with bony spiculæ and plates, and discharging a bloody mucus, or sanies, instead of pus* or serum. The dilated shell of bone turns out to be filled with solid instead of fluid matters; and if we do not denominate such tumors osteo-sarcomas, we shall have to call them fleshy spina ventosas. They differ, however, very greatly from genuine spina ventosa in one respect;—the outer shell of bone

* I am now attending a lady, 54 years old, Mrs. D. H—, who is afflicted with a large non-malignant osteo-sarcoma of the right half of the lower jaw, which is constantly discharging healthy pus. It commenced six years ago, probably from diseased teeth on that side, and was taken by her first physician, in the country, for a common case of spina ventosa. The whole osseous shell was for a long time enlarged in all directions; but finally gave way above, and a tolerably firm, fleshy-looking fungus shot up into the mouth. About a year ago, she first came to town, and placed herself under my care. She was then altogether too feeble to undergo anything but palliative treatment. After the use of tonics and an improved diet, however, she gained considerable health and vigor; and about Christmas time, I relieved the mouth of an enormous tumefaction, by evacuating a fluctuating cavity in the anterior part of the ascending ramus, which discharged a glairy fluid. Since that period, she has been troubled occasionally with small abscesses in different parts of the tumor, from which I have repeatedly evacuated pure pus. About two weeks ago, a large abscess pointed on the outside of her cheek, and burst spontaneously with another free discharge of pus. The whole surface now suppurates, and pure matter is incessantly discharging from several lips and fissures within the inner surface of the tumor. Instead of weakening, her constitution is steadily improving, and there is no symptom of malignancy about her. She is, however, excessively sensitive in regard to any serious operation, or I would venture upon the removal of the whole of the fleshy and fungous substance, by gouging or scraping out the contents of the thin bony shell, taking care to leave the bone and periosteum along the base untouched. This is certainly a case of non-malignant osteo-sarcoma of the lower jaw-bone. It differed from the case which I have extracted from the "London Lancet" for Feb. 1847, as a good description of fibrous tumor of the jaw, and placed in the note to page 325, inasmuch as the swelling commenced wholly in the interior of the bone, and dilated the jaw in every direction, instead of jutting directly upwards into the mouth. But in other respects the two cases may be alike, although this now puts on the appearance of a non-malignant osteo-sarcoma.

will not contract and assume a natural and healthy condition after the cavity is laid open. All we have to do in general for the spina ventosa, is to lay open the cavity freely, especially in a dependent position. At most, the contents will only have to be scooped out, and afterwards stimulating and corrective washes and powders will excite healthy granulations, and contraction of the distended bony shell nearly to its original situation. The fleshy contents, however, will usually rise up through the opening, and protrude in the form of fleshy or fungous masses, which will keep up an incessant and exhausting discharge. When these are not excessively vascular, and discharge pure pus alone, it will generally be safe to treat them as cases of simple spina ventosa, and proceed to make a large opening along the whole length of the tumor, and then scoop or scrape out all the fleshy and reticulated contents. Subsequent dressings with dry lint and mild escharotics, or astringents, will then restrain hemorrhage, and promote healthy granulations and closure of the whole cavity. Generally, however, such fleshy contents of the bone are altogether too vascular and irritable to undergo this mode of treatment; and the cavity will not afterwards assume a healthy suppuration and granulation. A steady hemorrhage or sanious discharge will continue for a long time, the dilated shell will undergo exfoliation, and in all probability, the thickened periosteum will slough away, to the great disturbance of the surrounding parts. The least harm that has ever followed such attempts, has been an inveterate and incurable caries of the whole surface of bone involved, and a foul fungus has shot up from the cavity, and reproduced a worse form of the disease.

It is possible that cystic sarcomas, or cystoid formations within a distended exterior of bone, may do better under such an attempt; but all prudent surgeons here have preferred to attempt the cure by a more efficient operation. When such affections occur on the extremities, amputation should be performed, and similar enlargements on the skull, lower jaw, ribs or clavicle, should be treated by an exsection of the whole of the diseased part. It is possible to leave a considerable portion of the thickened periosteum of the lower jaw*

* Many years ago, I extracted a necrosis of the whole lower jaw from a little girl, about eight years old, the daughter of Mr. Tully, and a patient of the late distinguished Dr. Eberle. The body of the dead bone was first sawn through at the symphysis, and the two halves extracted through the undilated mouth by a strong pair of forceps. The whole substance of the bone came away, up to the

and clavicle, and of the ribs, just as we do the subjacent dura mater, when we excise such tumors of the skull, and thus to favor a considerable reproduction of bone, which will prove eminently serviceable in mitigating the defects which would otherwise result from the operation. In all cases, however, of firm tumors, especially where the external surface of the bone is affected by the disease, it will prove impossible to save the periosteum, and no other prospect of reparation of the lost substance can be held out, than a partial substitution of ligamentous matter, into which the granulations can sometimes be converted.

Malignant Osteo-sarcoma.

Although we have not yet arrived at the proper consideration of malignant growths in our programme of the classification of tumors, still it is impossible to avoid the complication of this subject with swelling of the bones. As we have observed before, a perfect

coronoid process and condyles on each side, and a large mass of spongy granulations which shot up from the remaining periosteum below, were occasionally kept down by the action of solid lunar caustic, or sulphate of copper. In a few weeks, the periosteum secreted a new and slender plate of bone, which kept the chin prominent, and maintained a tolerable shape of the original entire circle of bone, from joint to joint, on each side. The angles were very obtuse, indeed, almost deficient, but the little girl grew up to become a fine-looking woman, with a very narrow lower jaw, and deficient teeth below. Some of my friends thought I must have left a thin plate of sound bone behind at the time of the operation; but they were mistaken. Dr. Eberle and I both decided that nothing but thickened periosteum was left along the base of the jaw. I have since repeatedly cut and pried away considerable portions of spongy and carious remains at the side of bones affected by spina ventosa, and also removed solid pieces of the whole substance in a necrosed state, and the periosteum has afterwards become ossified in each case, and made a tolerable and useful splicing up of the deficient space. It is always a very great object with the operating surgeon, to leave as much of the periosteum as possible in such cases, for when we have to take it entirely away, with whole masses of the diseased bone affected with any of the forms of the vaguely-denominated osteo-sarcomata, the break can never be supplied with anything else than ligamentous matter inside the skin. The same good result may be accomplished in cases of removal of some of the diseases of the clavicle which require exsection, by leaving the periosteum behind, and by subsequently keeping the shoulder elevated to its natural position for several weeks, by an appropriate apparatus. Interspaces in the length of the ribs may be managed in the same way, after some of our operations.

arrangement is out of the question in a practical discussion of this perplexed and intricate subject. Having treated of the simple, if not homologous, tumors in and upon the bones, it is now more convenient, and perhaps useful, to introduce the more deplorable forms of disease which partake of the same external characters. After leaving out of view the fibrous and enchondromatous and other chronic tumors of the bones and cartilages, we still have to encounter a variety of rapidly developed and destructive growths which not only tend to the impairment of life, but also exhibit an especial liability to return after their removal by surgical operations. Indeed they present all the characters of malignancy which are attributed to cancers and cerebriform tumors, and are equally marked with the latter class by all the peculiarities of heterologous formations. For the purpose of summing up all the common traits of these allied affections under one category, many authors have preferred to denominate them *cancers of the bones.*

In the development of malignant osteo-sarcomas, the true bony element is in no wise differently affected from the alterations we have already described in the history of fibrous and cartilaginous, and the other non-malignant, tumors. Whenever the morbid growth takes place on the outer surface of a bone, the solid structure underneath is gradually absorbed as the tumor progresses, and the periosteum alone covers the exterior of the entire mass. But when the morbid deposit occurs in the interstices within any bone, its interior is hollowed out into numerous irregular cells, more or less enlarged, and comprehended between bony spiculæ and lamina, inextricably interwoven together; while the exterior crust is distended along with the periosteum, sometimes into a smooth and rounded, but often into an unequal and undulated mass. The nature and character of the malignant deposit upon or within the affected bone differ, however, in the respective cases altogether more than external appearance would ever lead us to suspect. It occasionally, although very rarely, resembles tuberculous or scrofulous matter; sometimes it appears truly scirrhous, or cartilaginous, in its consistence; but more frequently it presents all the marks and characters of genuine cerebriform or medullary fungus. Each of these again may degenerate in spots or spaces into a soft and pulpy or gelatinous-looking fluid, sometimes mixed with blood in clots or cysts, and sometimes complicated with hydatids or cystoids filled with glairy or bilious-looking fluid. The blood effused into the in-

terior of such masses, from previous concussions or other injuries, will sometimes be found to have become altered into dark coffee-ground-looking dregs, or black and inky-colored intermixture. The masses of brain-like pulp in the cerebriform variety, will occasionally become so red and vascular as to assume all the appearances of the fungus hematodes of Hey, and to bleed violently, and spout out bloody clots and fungus after exposure, from every breach, before death of the unfortunate subject. Sometimes, again, the numerous blood-vessels ramifying through such a soft and medullary mass, will enlarge and inosculate with each other during the progress of its growth so as to cause incessant pulsations, and produce the serious complication of an aneurism by anastomosis. Finally, one more cause of diversity in the appearance and character of these tumors exists in some rare cases. A deposit of the dark granular pigment cells, constituting true melanosis, may be either interstitially infiltrated, or collected in masses among the soft and medullary growths of osteo-sarcoma. This differing from the disorganized brown and black or blue blood, the result of acid reactions, we have before alluded to; and also from the slate-colored and greenish-black or livid stains produced by the precipitation of sulphuret of iron from the action of putrescent gases and alkalies. Although this kind of melanosis is of itself regarded as non-malignant,* it, on these occasions at least, in consequence of its combination with morbid elements, becomes malignant.

The external appearance of these tumors differs very much in different cases. Commonly the skin is tense, shining or polished, and alternated, and its subjacent veins are greatly enlarged and

* Perhaps I have made too great a concession to the opinions of others, especially of the German writers, in putting down this statement. Although I have often met with black patches, and even small tuberculous masses in the texture of the skin, and sometimes in the glands, which never extended or disturbed the integrity of the system, still, it has repeatedly occurred to me, that the disease has multiplied itself, and extended to malignant ulceration, and finally destroyed life independently of any manifest connection with other deposits. I have lost two patients with simple melanosis developed in the form of tubercles under the skin, which returned over and over again after extirpation, and finally destroyed life by foul ulceration and marasmus. The only parts where I have seen this deposit prove innocuous, have been upon the lips, forehead, and in the bronchial glands. It is questionable whether the true granular pigment cells do actually exist in such cases. But I shall find opportunities of elucidating this subject under other heads.

branched out extensively beyond the periphery of the swelling. The mass below them feels tense and elastic, with a firm horizontal or bony capsule, which is often nodulated or irregularly indurated in patches with membranous interspaces between. Sometimes there is a deficiency of external vessels, and the skin is loose and thickened by œdematous or relaxed cellular texture intervening between it and the subjacent capsule of the tumor. In some rare cases the whole surface feels cold and doughy, like a pudding tied firmly in a bag, without any ossified mass or even patches below. This latter condition of course only occurs when the morbid deposit has been laid down originally on the external aspect of a bone, and then it resembles in some degree a fungous tumor of the soft parts. The bony lumps or nodules, in the first description of cases, are supposed by some to result from irregular patches of ossification in the distended periosteum; by others to an irregular absorption of the exterior bony crust, more or less complete in some spaces, with the entire and undiminished thickness in others. Neither of these explanations, however, is applicable to all the cases, for sometimes the same bony tubercles or nodules which project externally, are also distributed internally throughout the whole mass of the tumor. This is especially apt to be the case when the interior contains a large proportion of cartilaginous or fibrous and fatty matter. Indeed, there is no end to the diversities and complications of these sorts of tumors. Almost every species of homologous as of heterologous or malignant formation appears in some instances to be interspersed and intermixed in such proportions with the others so as to defy all description and classification.

From a consideration of all these circumstances it will be obvious that every attempt to designate any particular trait or character of this disease by a specific name, will fail in obtaining the desired object. Sir Astley Cooper certainly fell short of his aim when he employed the terms *fungous or fungoid exostosis;* because many forms of it are destitute both of the characters of exostoses and of fungous deposits. Mr. Travers failed in the same way when he devised the name of *osteo-medullary tumor.* If we were to determine upon adopting these epithets, we might as well go on to employ the titles of osteo-fibrous, osteo-enchondromatous, and osteo-carcinomatous, and osteo-melanotic tumors, to designate the other varieties of the same diseases. Neither of these appears to deserve

the distinction of a species in this class of formations; for all are characterized by the same disposition to malignity of progress, to return after excision or even amputation, and to a final termination in incurable pulmonary disease. Even the pure cancers and medullary or encephaloid diseases of the soft parts, are found to be much more closely allied to each other in their nature and terminations, than was formerly supposed. Since the introduction of microscopical pathology, it has been ascertained that they both are constituted essentially of the same radical elements of corpuscular structure, and that their chief differences arise from the stroma or basement textures in and among which they are deposited by the perverted action of the capillaries, or the morbidly constituted products of nutrition. They, with each and all of the forms of genuine osteo-sarcoma, occasionally follow each other in succession, in the same constitution, and are sometimes developed at the same time in company with each other, even in close contiguity of parts. Even the fibrous and enchondromatous tumors of the bones, although put down in our classification under the head of simple and homologous formations, are sometimes followed by the appearance of genuine medullary or carcinomatous growths, and all their distressing and uncontrollable sequelæ on the part of the constitution.*

[* It is not an unfrequent occurrence to meet with one form of malignant deposit supervening on the removal of another. I have observed several curious instances of the different varieties succeeding each other, and even existing at the same time in the same individual. In 1845, I amputated a thigh through the trochanters for a medullary fungus extending from below the knee almost to the groin. The patient recovered from the operation, which was performed chiefly for the purpose of checking a profuse hemorrhage, caused by the tumor having been incautiously punctured, and was apparently doing well, until about eleven months after, when he was seized with what is vulgarly called a galloping consumption, and rapidly hurried to the grave. On a post-mortem examination, he exhibited the most extensive case of morbid deposits I have ever witnessed. Both of the lungs, the bronchial and mesenteric glands, those of the groin and neck, and indeed almost all the lymphatics, were affected with the different forms of malignant growths, and even the liver and spleen were studded with tubercles. The lungs, which, at the time of the operation, seemed comparatively sound on auscultating them, had become almost one mass of disease, principally tuberculous and medullary; and in the right one, there were two large abscesses filled with thick offensive pus.

In the different parts of his person there were found examples of scirrhous, encephaloid, as well as tuberculous and scrofulous, deposits. Those which, at the time, were supposed to be melanotic, I have since satisfied myself to have been merely the ordinary carbonaceous matter of the lungs mixed with the dis-

Indeed, it ought to be anticipated that, in all cases where such a perversion of the natural actions and soundness of the system as can originate morbid growths of any kind, has prevailed, disastrous consequences should be entailed upon the whole organization. It may be laid down as an aphorism in pathology, that whenever new formations are developed which exhibit a wide departure from the healthy structures, the functions of assimilation and nutrition must previously have been deranged, and such a cachectic habit have been generated as will always favor the appearance of phthisis, of scrofula, or of cancer. The experience of every practical surgeon is full of such facts as go to enforce the truth of this aphorism; and, unfortunately, the most difficult part of our duties consists in warding off the sequelæ of these organic diseases which we attempt to relieve by operations. The essential point of difference, under this view of the subject, between malignant and non-malignant tumors, consists chiefly in the fact that, while in the former the constitution is so far depraved that a tendency to return, or to the production of even more injurious consequences, cannot be overcome; in the latter class of affections our precautionary or preservative plans of treatment prove more successful.

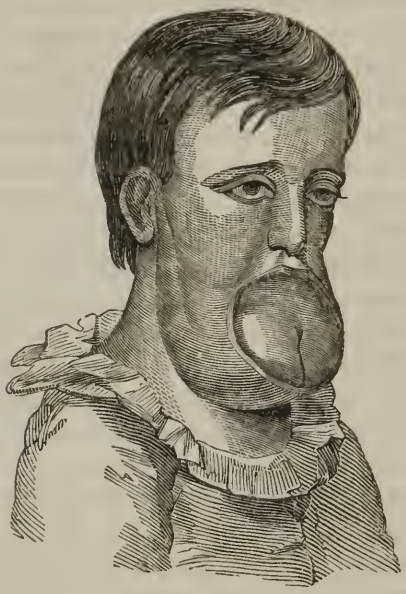
The symptoms which accompany the development of osteo-sarcoma, are very different in the acute and chronic cases. When the disease, in any of its forms, follows a concussion or contusion, or wrench or sprain, the progress is more rapid and painful than in the cases which occur spontaneously from the mere influence of constitutional tendencies. There is, on such occasions, a great deal of local congestion and irritation, and also more or less febrile derangement of the whole economy. General and local depletion, cooling and evaporating applications, perfect rest, low diet, and repeated purgatives, with elevated posture of the affected part, will often check the irritation and mitigate the progress of the disease, although it will always prove distressing in the end, to find that nothing can effect an entire cure. We often mistake such cases at first for local inflammations of the bones or joints, and persevere a long time in the hope of overcoming all the symptoms. But the persistence and gradual, though somewhat checked, progress of the

eased mass. Even the liver and spleen were studded with tubercles, whilst the stump was sound.

Cruveilhier, in his morbid anatomy, gives several plates illustrating the deposition of all the different malignant diseases in the same person.—Ed.]

swelling will eventually signify to us the magnitude and importance of the case, and we are finally driven to the consideration of the necessity and propriety of a surgical operation of some kind for the removal of the tumor.

*Fig. 7.**



* [It was for the removal of osteo-sarcomatous tumors, that the author performed many of his operations on the upper and lower maxillary bones. He repeatedly removed the lower jaw from the articulation to the symphysis, and several times its entire body from the angle forwards. Fig. 7 represents his first case of the kind, performed in 1823, which I insert on the next page. The upper maxillary bone he removed as early as May 15th, 1822, from Solomon Derrickson, a colored man, along with the malar, a portion of the external angular process of the frontal bone, and the lachrymal gland. This was before Lizars', (in 1827,) but the author never claimed, or considered it as an original operation, as it had been performed and recommended several times by the older surgeons. This operation he repeated in a number of instances; and in one case, the last performed by him (in 1846), in addition to the bones just mentioned, he removed the vomer, and exposed the body and pterygoid processes of the sphenoid bone, leaving the eye unsupported, and only retained in its place by its muscles, nerves, and surrounding cellular tissue. That patient, Mr. Reinhart, of Marietta, Pa., recovered with little inconvenience, and I saw him a few months since, exhibiting much less deformity than would be supposed.

In none of these cases, nor in two successfully performed by myself on the lower jaw, one from the articulation, and the other from the ascending ramus

In the chronic forms of the disease, the symptoms are so slowly developed, and the local and general irritation is so slight, that few patients apply to us until the tumefaction has become great, and the nature of the affection fully manifest. No exciting cause is

to the symphysis, was it found necessary to tie the carotid artery. The author was always opposed to it, and published some remarks on this subject, as well as on the reproduction of bone, after the operations on the lower jaw, in the "*American Medical Review*," as far back as Sept. 1825. Indeed, it was very seldom that he tied the carotid artery as a preliminary measure, in any operation for the removal of tumors. He depended rather upon securing it in the course of the operation, if compelled by hemorrhage, as it could always be controlled sufficiently long for that purpose, by the pressure of an assistant's finger upon the primitive trunk. His mode of operating in these and other cases, was by using the fingers, and handle of the scalpel much more than its cutting edge, and thus tearing across the vessels, they retracted into their sheaths, with very little hemorrhage; and I have seen him, over and over again, successfully treat vessels of even very considerable size in this way.

The following case, along with the plate (Fig. 7), I extract from the "*First Lines of Surgery*," by Samuel Cooper, who first copied it into the English edition from the Medical Review. It was performed, as will be seen, at a very early period, and was among the first operations of the kind.

"In 1823, Dr. McClellan, of Philadelphia, amputated the body of the lower jaw-bone, affected with osteo-sarcoma. The whole of its substance, in front of its angles, was enormously enlarged, projecting downwards in front of the neck, and backwards into the throat, attended with an enormous swelling, that extended upwards from the inner surface of the bone, and protruded outwards, so as to look exactly like an enlarged tongue. It rose above the molar teeth, pressed firmly against the roof of the mouth, and quite overlapped the incisors, which were concealed in its substance. Its posterior limits could not be discerned; but, on pressing it down with a spatula, the apex of the tongue could be seen resting upon it behind. Indeed, the tongue was pushed nearly into the pharynx, and hence the great difficulty of respiration and deglutition.

"Dr. McClellan made an incision through the integuments, from the left commissure of the lips, obliquely downwards and backwards, and carried it over the anterior edge of the sterno-mastoid muscle, so as to command the carotid artery, in case it should become necessary to secure it on that side. The front edge of this incision was next raised, and the lower part of the tumor exposed. Having ascertained that the carotid need not be touched, Dr. McClellan dissected up the integuments forwards, until the whole surface of the tumor was exposed round to the opposite side. Paying no attention to the small arterial twigs, which were divided, he secured at once the facial artery, on each side, just where it emerged from the sub-maxillary gland. The bleeding from the small branches immediately ceased. He then dissected up the insertions of the masseters, a little way behind the tumor, and exposed the sound bone, which was now divided, on each side, with a metacarpal saw. The whole tumor was next turned outwards from the mouth, and carefully dissected from

perhaps then complained of by the sufferer, and probably his case has been mistaken for one of white swelling or chronic abscess. In general it happens that the external deposits upon the bones present the chronic and painless character; while the internally developed osteo-sarcomata are accompanied by distressing pains and irritative fever. In the chronic forms, most surgeons consume altogether too much precious time in their useless endeavors to disperse the swelling by blisters or discutient and counter-irritating plasters and ointments, with harassing or debilitating courses of constitutional remedies. Sooner or later, however, they are driven, as certainly as they have been in the acute cases, to meditate upon the propriety of an operation.

Under such circumstances, two very different methods of procedure have been followed by practitioners. One consists in dissecting and sawing away the whole mass of the affected bone, and afterwards by bringing the flaps of divided integument again over the exposed surface, endeavoring to effect a speedy closure of the wound. In many external osteo-sarcomas, before the disease has caused an extensive absorption of the sound bone below, this mode of operation can be resorted to with temporary success, but with very little hope of preventing a return of the tumor. In the majority of this class of cases, however, such an operation cannot be successfully executed, because the original bone has become so extensively wasted away and infiltrated by the morbid deposit, that the whole of the diseased surface and depth are out of the reach of saws and raspatories. We must in all such cases resort at first to the direct operation of resecting the whole substance of that part of the bone which is af-

the under surface of the tongue, the sub-maxillary glands, and muscles on each side. A part of the sublingual glands, and a considerable portion of the left sub-maxillary appearing unsound, were taken away. Only three more arterial twigs required ligatures. Lastly, the flap was laid down in its natural situation, and kept there with sutures and adhesive plaster; the large cavity under the tongue being partly filled with lint, so as to support the loose skin.

"The patient not only recovered from the operation, but she lived almost a year afterwards, enjoying perfect articulation, and a very useful degree of mastication. Dr. McClellan took especial pains to promote an abundant growth of granulations in the place of the tumor, into which lines of ossification soon extended, on either side, from the exposed surfaces of the sound bones. A new bony substance was thus formed on both sides, almost as far forwards as the upper cuspidati; the interspace in front being filled up with a dense substance, produced by the induration of the granulations of the part."—Ed.]

fected, if we do not amputate the whole mass and member entire. Whenever the amputation of a limb involved by the disease can be performed, it is unquestionably the best and most promising operation. Even the amputation should, if possible, always be carried across the sound portion of the limb entirely beyond the next joint above the tumor. Mr. Brodie first suggested the correct idea that an extension of the malignant matter is very apt to be deposited in the medullary cavity of all the long bones high up above the situation of the tumor, so that no confidence can be placed in any operation for a radical extirpation of the disease any where through the diameter of the same long bone. At least the operation should always be performed as high up above the location of the disease as possible, consistently with all the circumstances under which the patient is situated. Sometimes when the condition of things does not allow of going above a joint, the amputation may be executed at the very articulation itself, with as great a certainty of transcending the reach of all morbid deposition. At all events, if we are compelled to operate upon any long bone subject to the disease, we should select a spot entirely above the enlarged medullary cavity in its interior, because the internal contamination is generally manifested there, and does not often extend up to the superior cancellated texture.

The great question, however, under such circumstances, is, whether any kind of surgical operation will be likely to afford relief in any degree commensurate with the immediate danger and suffering which it will involve, and the probability of a subsequent return of the disease. Many authors appear to have concluded that the attempt never proves radical in its effects, and that, if the morbid growth does not soon return in the same parts, it will eventually reappear in some remote structure, perhaps even in the vital organs. Certainly a very rapid, or what is sometimes called the galloping consumption, is very apt to follow all the amputations which are unsuccessfully performed for osteo-sarcomas. When the happy patient thinks himself most safe in his apparent recovery from all symptoms of the disease, he is likely to be struck down with a sudden and incurable attack of cough and internal oppression, or a marasmus attendant upon a development of organic disease in the lungs, or some of the other important viscera. But although we must admit that such consequences are far too common to allow us ever to lay aside great anxiety for the fate of our patient, still, more fortunate results follow

some of our operations. Occasionally, the disease never returns, or affects any of the internal organs of life, and the constitution will recover with perfect ease from every subsequent attack of acute disease. It should be, therefore, one of our chief objects of discrimination between the various cases with which we meet, to decide when an operation will be likely to afford benefit, and under what circumstances it will, in all probability, prove unsuccessful.

Whenever the disease occurs upon the trunk, or about the attachment of either of the extremities to the body, and extends so deeply as to be out of the reach of any operative procedure, we have an opportunity of witnessing the horrid ravages of its unchecked progress, and to be disgusted with the cracking and yielding of the outer integuments, with the subsequent fetid and ichorous discharge, and the sloughing and bleeding protrusions of foul and offensive fungus. The constitution then begins to fail rapidly, and the prostrate and sinking condition of the miserable patient calls upon us loudly for commiseration as well as for relief. No surgeon has ever attended such distressing cases, without resolving to prevent these consequences in every instance, even of malignant osteo-sarcoma, where it is possible to perform an operation with any hope of success. If an affected limb can be amputated, or if a tumor of this kind can be removed from any part of the body without amputation, he always will desire to avert the effects of the ultimate stage of so malignant a disease, even when anticipating a subsequent return, or a final sinking under some incurable attack of pulmonary inflammation. Under such circumstances, palliation is better than no remedy at all; as a reprieve from a merciful executive is more to be desired by the condemned, than an order for immediate death. The patient himself will feel much better satisfied, after the most unfortunate result, when he has been convinced that every aid which surgery could afford has been extended to him. Most of those who are left to die with the original tumor, repine and grieve with sad misgivings to the last, that they had not been placed under the hands of some operator who might have given them the chances of the only remedy.

The conditions which will always prevent discreet practitioners from attempting an operation, are easily made apparent to the dullest comprehension. If the disease is developed on two or more parts of the body at the same time, or extends from a single location either through the medium of the lymphatic or membranous

textures, so to be out of the reach of a complete operation, all efforts at a cure must be abandoned. In the same way we are prohibited from giving countenance to any such procedure where there are palpable symptoms of any internal derangement of structure. If auscultation or percussion, or even any of the rational modes of diagnosis, give us grounds for suspicion of internal tubercles, of scirrhosis, or of ulcerations, we abandon everything but palliative treatment. Obstinate dyspepsia, marasmus, or cough, or any other decisive symptoms of visceral affection also contraindicate an operation under all circumstances and forms of the external disease. Severe constitutional irritation, especially when connected with rapid progress or enlargement of the tumor, and a perverted state of any of the important functions of the body, render the propriety of all operation very doubtful. Excessive agitation and direful forebodings of mind on the part of the patient ought also to restrain the surgeon. As the final event will always appear uncertain, it will be wrong to urge a sufferer against his irrepressible fears to undergo a severe operation for this disease. When the patient ardently desires the attempt and the operation, and indulges no apprehension of consequences, it will be much more safe to gratify him; especially if he makes up his decision after a full knowledge of all the subsequent uncertainties in regard to a permanent cure. His mind will then prove to be in such a state as can best undergo the shock and agony* of the undertaking. The condition of children must,

* [At the time these remarks were written, little was known in this city of the effects of sulphuric ether in removing the pain of surgical operations. The author had only received the earlier rumors of its application, and though strongly inclined to its use from the high authority of Drs. Warren, Hayward and others of Boston, in its favor, had had no opportunity of himself testing its merits. Now, however, the experience of the profession in nearly the whole civilized world, has proved beyond a doubt the marvelous efficacy of *sulphuric ether* and the more preferable *chloroform*, not only in surgery, but also in the practice of medicine and in midwifery, and we may therefore regard them as already established agents of the materia medica.

This, the great discovery of the age, has already relieved surgery of half its terrors, and we may hope that the fatal error of postponing surgical operations until the knife is the only and perhaps too late alternative, will now in a great measure be done away with. Diseases, which in their earlier stages, before the system has become contaminated, may be removed with safety and prospect of permanent success, are too generally allowed, from mere dread of the surgeon, to progress, until nothing short of our most formidable and hazardous operations can check their ravages, and then too often, from the extent to which they have proceeded, they are of little avail.—Ed.]

of course, be decided for by their parents, or guardians; and when they discover hope and confidence in the countenances of their natural protectors, they can be induced to yield themselves up with least discomposure to their professional attendants. It is impossible to overrate the importance of a frank and candid statement of all the difficulties and uncertainties of the event in every case, to the intelligent friends of the patient. Our explanation of the prospects of a more favorable result, which we desire to anticipate in all cases where we operate, will then be received with much greater satisfaction, and vigor and hope will thereby be infused into the mind of the sufferer. Even in dangerous states of prostration from the irrepressible hemorrhage which sometimes follows imprudent incisions into the vascular forms of such tumors, or a sudden giving way of the integuments under increased excitement, a decided statement of the fact that the amputation can only prove palliative by protracting life for a few months, or weeks, will induce most patients to implore us to go to work on the instant. Although they cannot say, under such circumstances, in the language of the poet, "one day, one hour of virtuous liberty is worth a whole eternity of bondage," they will realize that a very short reprieve is better than a sudden, inevitable death. Distressing as such cases are, however, and disagreeable as it always is to undertake an operation in such a critical condition of things, still life may occasionally be protracted to an indefinite period by a bold and prompt procedure. Especially if the disease has been old or chronic, before the exasperation by some injury which has caused the hemorrhage and sudden prostration, and the system has not been sinking for many days previously from mere violence of irritation, it will be possible to amputate without any immediate danger of death.

As we have now granted the widest latitude in favor of surgical operations for the attempted cure of the osteo-sarcomata, and as many practitioners are in the habit of more frequently reverting to this terrible expedient than is considered proper by metropolitan surgery, we ought to state very explicitly some additional restrictions which have been established by experience. If the disease is of a highly acute character, if it has made a very rapid progress from the start without having proved at all amenable to any kind of palliative treatment, and especially if it has originated altogether from constitutional causes, there will be no use in performing any operation. The patient will then not only be in great danger of

sinking under the attempt, but the disease will be sure to return afterwards, very steadily, either on the surface or on some of the interior organs of life. It is only in the slowly progressing, or chronic cases, that do not call the constitution into much sympathetic derangement, and that do not very extensively contaminate the soft parts exterior to the bony tumor, that operations can prove successful. We grant that, in some cases, after the acute symptoms of the earlier stages have been in some measure overcome, and the system has begun to manifest the power of constituting a barrier to the further progress of the disease, a favorable result can be anticipated. We admit, also, that if a chronic case has been temporarily exasperated by a sudden injury or local perturbation of any kind, it will be possible to afford relief during the persistence of the irritation, and, sometimes, even of prostration. This will be the case especially if we remove a greater source of irritation and depression than either the operation itself, or its immediate consequences, can inflict upon the system. Close attention, however, should always be paid to the condition of the vital organs and their functions, before we come to a conclusion in favor of the operation. It will not prove sufficient to satisfy ourselves in regard to the heart, the lungs, and the stomach alone, as is too commonly the case with surgeons. The condition of the brain and the liver should also be attended to, and any symptom of organic disease in those organs should always be considered as prohibitory of any operation. The same thing may be observed of the kidneys, which are especially liable to perversions of function, during the existence of osteo-sarcomas. If there be incessant pain or a sense of weakness about the loins, and the urine at the same time be coagulable on boiling, no surgery can prove of avail, at least during the persistence of such a condition. The true albuminuria, or disease of Bright, is always a radical objection to an operation in any disease. The cachectic, sallow, wan and cadaverous habit, also, which usually accompanies albuminuria, and which may occur independently of it in cases of osteo-sarcoma, is a serious impediment to all surgical efforts. The consequent debility is so great that most patients will sink under the shock of an additional injury, and the recuperative efforts of the system will always prove so feeble as hardly to effect the cicatrization of the wound. Indeed, many of the patients who apply to us for relief under such circumstances, may be considered as already dying, and it will be absurd to encourage them with any other hope than that of a better life hereafter.

If in any case we have had the good fortune to perform a successful operation, and it is called a successful one when it has relieved all the previous symptoms, our next great object should be to avert the dangers of a return of the disease. Instead of running to the newspapers, or ephemeral journals of the day, with an inflated account of our "brilliant and unparalleled" operation, we should immediately set about the business of eradicating the disposition to morbid growth. After having regulated as fully as possible all the various secretions and exhalations by the use of common therapeutic agents, we should pay very close attention to the diet and regimen which may be suitable to each individual case. It is always a matter of exceeding importance to adjust the kinds of food to the wants of the economy, without either over stimulating the digestive organs or filling up the circulation with useless and unassimilated particles. The function of assimilation is at least as important in this condition of things as that of digestion. It makes no difference in this respect whether we attribute the element of malignant deposits to irregularly constituted microscopic cell-corpuscles, or to the imperfectly elaborated quaternary compounds of the chemical elements of organization, inasmuch as the original supply of nutritive particles must in a great measure control them. In general, plain water for drink at all times, with properly prepared farinaceous food, in combination with moderate proportions of milk, or eggs, or the light meats, will be the appropriate diet. Daily ablutions of the skin with salt water, followed by friction over the whole surface with a brush, dry salted towel or flesh brush, the regular use of clean flannel and warm clothing, and free exercise out of doors in pleasant weather, should all be enforced with the greatest scrupulosity. In regard to the use of alterative or constitutional remedies, practitioners have differed very much. Many of the most judicious insist upon it that a constant attention to laxatives is all that is required in this way, while others of equal respectability of character think it important to give tonics, especially the chalybeates, in all cases, and to continue them months after all symptoms of debility or constitutional derangement have disappeared. The English surgeons have generally preferred to follow Sir Astley Cooper's recommendation of the long-continued use of small doses of the corrosive sublimate in sarsaparilla syrup; and many of our practitioners add some of the preparations of iodine to the same formula. The proper plan, however, is unquestionably to adapt the treatment to the

exigencies and peculiarities of each individual case. In addition to the general course we have directed, vegetable tonics should be given to the infirm and weak, chalybeates to the anemic, and alteratives to those whose secretions and exhalations are habitually defective. A change of climate and of water is also of great importance in many instances. If the disease has been generated in a miasmatic district, it will prove impossible to restore the entire soundness of constitution until the patient is sent to a primitive and healthy region of the country. Very often cases from the interior are speedily benefited by a residence on the sea shore; and, *vice versa*, people from the coast undergo a change of constitution after migrating into the mountainous atmosphere. As a sound practical precept one may lay it down that a change in all the leading circumstances under which the patient was situated before the development of his disease, will be likely to assist in eradicating the elements which may tend to reproduce it after recovery from a surgical operation. Some practitioners, influenced by their ideas of the importance of allowing free escape of the morbid humors, profess an extravagant opinion of the perpetual use of issues or setons near the original seat of disease. It cannot be doubted that, in all cases where there is any difficulty in maintaining a free transpiration from the external surface, or when any other important outlet for the discharge of the effete elements is deficient, an external drain will be likely to prove serviceable. It not only ensures the direct evacuation of an undue proportion of the pale corpuscles of the blood, and guards against the possibility of plethora and unnatural determinations to predisposed organs, but it also calls into action, by the influence of sympathy, the natural secretions and exhalations.

II.—MALIGNANT GROWTHS IN GENERAL.

Pseudo-plasmata, or Malignant Hetorologous Tumors.

We have already anticipated, contrary to the strict rules of classification, under the consideration of the osteo-sarcomata, much of what we should otherwise have to say in relation to this important subject. But, nevertheless, a great deal of pathological and practical matter remains to be discussed under the head of the pseudo-plasmata in general. The several species of these unnatural or he-

terologous formations, are characterized by common traits, as well as by individual peculiarities, which may serve to divide the whole group or genus into so many distinct species. Microscopical investigators have attempted to classify them according to the form or morphological development of their elementary molecules, or as they call them, formative cells. But their efforts have proved, so far, in a great measure unsuccessful, and the chemical analysis of their organic elements, especially as relates to their modification of the protein compounds, now receives as much credit in establishing their position as it did before the cell-doctrine came into vogue. Neither chemistry, however, nor the minutest ocular observation of their corpuscles, bears any marks of value in comparison with a careful exegesis of the physical characters of these growths, and the pathological condition of the system which forms them. Everything, however, in the form of a fact or phenomenon, which either of these modes of investigation has brought forward, should be considered, in order to form a clear conception of all the bearings of so important a subject.*

Although all the forms of these pseudo-plasmata originate in a deposit of the coagulating lymph (cyto-blastema) from the capillaries into the common cellular interstices of the different organs of the body, which, either before or after its coagulation, becomes crowded with a secondary formation of its constituted cells or corpuscles, still the degree of their organization varies very greatly. In some, the interstitial cellular tissues become speedily attenuated, or broken down, and resolved among the mass of apparently unorganized new growth, so as to present an almost homogeneous-looking whitish or yellow lardaceous pulp, which appears to the naked eye like a collection of foreign matter, passing into the condition of an abscess. In other species, the same cellular texture becomes indurated and hypertrophied in and among the morbid mass, and in many parts becomes converted into deep and thick fibrous bands or plates, which give great firmness and appearance of a high organ-

* Vogel gives the following elucidation of his views concerning the difference between malignant and non-malignant growths. "In another point of view, the newly-formed tissue is either persistent, or, in other words, forms a permanent part of the body, and is there nourished like any other portion of the system; or else it is transitory, and after a time softens, breaks up, and is removed. This is the leading difference between non-malignant and malignant epigeneses."

ization to the tumor. In still other forms, the reticulations of the areolar tissue become altogether more complicated and delicate and vascular than natural, and maintain the contained morbid exhalations in a more soft and pulpy state, than ever happens in the apparently unorganized pseudo-plasmata.

These three different conditions or modifications of the organization of the containing areolar tissue and its heterologous contents give rise to a well-founded division into three classes of disease. 1st. *Scrofula*, and its varieties. 2d. *Carcinoma*, or *scirrho-cancer;* and 3d. *Encephaloid disease*, or *medullary fungus*. Although the first of these affections resembles very much the appearance of cheesy matter or true casein, and the second, condensed gelatin, in the form of fibro-cartilage, while the third is likened to the pulpy substance of the brain, nevertheless the diversity of their structure depends more upon the histological character of their organized element, than upon either the chemical or microscopic character of their interstitial or contained deposits of pseudo-plasmata. These three different forms of analogous disease differ, also, in their degrees of malignity, the first being only moderately or partially so; while the others are universally regarded as altogether highly malignant in their disposition. But we will speak of them more particularly under separate heads, and first of scrofula and its congeners.

Scrofula.

Scrofulous growths present three forms of manifestation: first, in and around the lymphatic ganglia and in the conglomerate glands, and less frequently in other organs or parts, in more or less irregular masses or collections; secondly, in well defined spherical tubercles, which always appear circumscribed or well-defined, first in the form of small points or grayish granules, and afterwards enlarge into distinct tubercles. These form most frequently in the lungs, where they often become the foundation of true phthisis. They occur also in the brain, and sometimes in the liver, spleen, and other important viscera. The third variety appears during the progress of typhus fever, and is deposited more rapidly than either of the former kinds, between the muscular and mucous coats of the intestines, especially near the lower extremity of the ileum, in the mesenteric glands, and also in and under the mucous membrane of the trachea. It is said, moreover, to occur, although less frequently, in the sub-

stance of the lungs, and in the spleen. In protracted cases of low typhus fever, it appears to be excessively developed in Peyer's glands, when it finally becomes softened down and converted into large patchy ulcers. In the severe pulmonary forms of typhus, especially, it is deposited under the mucous membrane of the lungs, even to its extreme ramifications among the lesser bronchia. "These formations," says Vogel, "usually appear as a more or less firm lardaceous mass, of a yellowish or whitish color, which is deposited in greater or less abundance amongst the normal tissues, gradually softens, and as the normal elements of the region become also dissolved in this process, forms ulcers, which either heal by cicatrization, or continue until after the death of the patient. In many cases, death takes place before the commencement of the softening." He also thinks that the typhoid depositions are secreted in "the fluid state, and subsequently assume the solid form by coagulation; otherwise it could not so completely fill up the interstices of all the tissues." "Under the microscope the following constituents are recognized in the mass:

"1. An amorphous semi-transparent stroma, (basement or groundwork.)

"2. Molecular granules from a size too minute to estimate, to the 800th of a line in diameter; sometimes interspersed with larger fat globules.*

"3. Larger corpuscles (imperfect cells and cytoblasts), from the 800th to the 300th of a line in diameter, rarely larger. Some of these enclose smaller corpuscles (elementary granules and nucleoli), which are wanting in others.

"The softening of typhus matter usually proceeds rapidly, fol-

* Vogel, in another place, in commenting upon the defects of Schwann's cell-theory, says: "There are numerous exceptions (to Schwann's doctrine of universal cell-formation) in the transitory formations, i. e. in the tissues which, in their perfect condition, do not retain their cellular form. In these cases we frequently cannot detect any cellular formation throughout the whole process of development, or at most a mere analogy—a faint tendency to the formation of cells; but no such actual production. This occurs in scrofulous and tuberculous exudations, and in a great number of the cases of tubercle. Here we first find an amorphous or finely granular exudation (blastema) forming a tenacious and tolerably firm mass, which by degrees breaks up into a more or less fluid magma, exhibiting under the microscope, indefinite granular molecules of various forms and sizes, sometimes resembling cytoblasts and cells, but never indicating a decided cellular formation."

lowing the deposition in the course of a week or only a few days; it is but seldom that several weeks intervene. The typhous matter

Fig. 8.

Microscopic appearance of typhous matter from the mesenteric glands—A, an amorphous, slightly granular mass of a brownish-white color, with an immense number of cells deposited; B, the amorphous mass treated with acetic acid, by which it was rendered transparent, and gradually dissolved, upon which many minute cells (nuclei?) with a sharp outline, came into view, being unaffected by the acid.—(Vogel.)

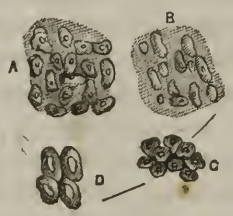
cannot be histologically distinguished from the deposits which occur in scrofulosis and tuberculosis; distinctions may, indeed, be sometimes perceived between their different deposits; but they are not greater than are observable between the varieties of typhous matter. Neither can it be distinguished with precision from many forms of inflammatory exudation in the early stages of development, nor from the product of many malignant suppurations, from exudations in gangrenous parts and similar processes; whilst its differences from normal pus, and from the more highly organized pseudo-plasmata, are very obvious."

This notice of a peculiar deposit in typhous subjects, does not involve the hypothesis that there is a preliminary formation of it in the blood, of which the system is relieved by the localization of the disease after its exhalation underneath the mucous membrane of the bowels. It is highly probable that the morbid development arises from the diminished energy of the inflamed tissues during typhus fever, being unable to organize the fibrinous effusion into and among

them, so that the exudation becomes amorphous, and afterwards undergoes disintegration. But it is not necessary to dwell longer upon this subject; we have only introduced it here to render more clear the peculiarities of scrofula and cancers.

The peculiar matter of scrofulous glands and pulmonary tubercles differs so little from the typhous deposits, that we need not dilate at greater length upon them. They both are marked by a very slow comparative development, and by a much slower progress through the ultimate stages of softening, and removal from their surrounding envelops. "The matter also exhibits in different cases great anatomical variations; it is sometimes dense and firm, so that their sections can be made; sometimes it is lardaceous, sometimes soft and crumbling like new curds. It is likewise sometimes colorless and semi-transparent, sometimes whitish, sometimes of a yellow tint. Histologically, it is perfectly similar to typhous matter, and consists essentially of the same elements; "it presents an amorphous stroma, molecular granules, and undefined cells and cytoblasts, varying in diameter from the 600th to the 300th of a line, occurring in very different proportions, and mixed with fat globules. The granules are partly protein compounds, partly fat, and in part calcareous salts. The latter disappear and effervesce on the addition of nitric acid." After its softening, the matter consists of the same indeterminate granular detritus as the typhoid deposit. Soft-

Fig. 9.



Tubercles in various stages of development.—A B C. Tubercles from the lungs of a young man who died of tuberculosis pulmonum.—A and B. Nuclei in an amorphous cytoblastema; most of the nuclei contain nucleoli.—At C the cytoblastema has disappeared, and the cells are in contact with each other.—D. Tubercular cells from the lungs of another young man. Here the cytoblastema has also disappeared, and the nuclei are inclosed in a cell wall; no nucleoli are present.—(Vogel.)

ening and ulceration do not, however, always ensue; in many cases, the above-mentioned calcareous deposition becomes predominant, and the mass is converted into a concretion. As the admission is now generally made by all the microscopists, that no distinction can

be made between tuberculous matter and that of scrofula or typhus, we do not feel required to dilate upon its peculiarities. It ought to be recollected, however, that the term tubercle has been employed at various times to designate other affections than this kind of morbid deposit. Thus the small and painful subcutaneous fibrous tumors have been called tubercles, and the decidedly fibrous and enchondromatous tumors of the uterus once received the same designation. The disposition to this really morbid growth is now frequently called, by way of distinction from such affections, *tuberculosis*, and the product is, as we have said, further marked by its strict analogy with scrofulous curd instead of organized fibrin.

Chemistry has done no more in the way of illustrating tuberculous growths by analysis, than microscopy by developing the corpuscles or cells. The opinion of former writers that it consists chiefly of casein, has not been fully sustained by the late investigators. Some think it a modified form of some of the protein compounds; while others assert that it undergoes a gradual change during its softening, and loses its original character in consequence of loss of phosphorus and sulphur. Others, again, think with Gerber that there are two kinds of tubercles, albuminous or unorganizable, and fibrinous or organizable. But the very fact that the latter are conceived to be capable of organization, proves that they cannot be the real tuberculous matter now under consideration. The softening of all these deposits, like that of others of a more decisively malignant nature, arises from causes inherent in the nature of the mass, or, as the German writers say, from *esoteric* causes, and finally occurs spontaneously; while the apparently similar softening down of the interior of large non-malignant, as the fibrous and enchondromatous tumors, arises from accidental circumstances, or *exoteric* causes, such as obstructed circulation, consequent disintegration, &c.

When these tubercles are of very small size, they may be rendered quite fluid by this process of softening, and afterwards entirely disappear under absorption promoted by therapeutic agents, and by counter-irritation. Larger ones generally become melted down into a puriform matter, which, mixed with the surrounding secretions, and the broken-down fragments of the undissolved curd, form an abscess, and discharge through the nearest outlet, as in cases of vomica. The consequent cavity sometimes contracts and heals with a grisly cicatrix; sometimes it becomes persistent, and lined with a reflection of the mucous lining of the passage into which it opens.

At other times, although more rarely, the mass becomes converted into a concretion from the predominance of calcareous salts, and remains for a long period afterwards encysted, without disturbing the functions of the surrounding parts. Every one unfortunately knows, however, how often the powers of the system fail in conducting these cases through such a favorable course, and how many daily fall victims to this fell disease.

In a strictly surgical point of view, these affections are of little moment to us, except so far as their elucidation seems to illustrate the pathology of the other species of morbid growths. Operations for the extirpation of either of these forms of deposit, are altogether out of question, inasmuch as all the accessible forms have a natural tendency to softening down and discharge by ulceration. All the mechanical and topical courses of treatment for their sequelæ have previously been considered under the heads of abscesses and ulcers. The constitutional treatment is, however, of vastly greater consequence, and that more properly belongs to the department of practical medicine.

Scirrhus, Scirrho-cancer, or Carcinoma.

The hardness and density of these tumors sufficiently explain the origin of the term scirrhus. The extension of enlarged cutaneous veins in various directions around, and also the projection of fibrous bands or striæ into the subjacent cellular and adipose textures, in every direction from the mass, gave origin to the name of cancer. It was once a favorite comparison with surgeons to liken long and narrow projections of any kind, to the claws of a crab. We have even seen, in Alibert, the same disposition evinced by his application of the word keloides (crab-like), from the Greek etymology instead of the Latin, to designate small pimples or tubercles of the face, which present colored lines radiating from them in various directions, either in the form of distended red capillaries, or of colored fibres of the areolar tissue. But such rude comparisons, although they have given origin to the names, can do but very little in the way of explaining the origin or nature of these morbid structures. In order to get a satisfactory knowledge of these points, we must go to the examination of the organic elements of the whole mass as they are exhibited in its interior. We shall then find, in all cases of true scirrhus, that the matrix, or stroma, as it is

now called, of the whole formation, is constituted either by a new development of cellular texture in the form of what is called a false membrane, or by an induration and enlargement, proceeding from a real hypertrophy of the areolar tissue, which originally existed in the interstices of the part where the disease has been developed.

Fig. 10.

Fibrous stroma of scirrhus, as shown by the microscope; meshes formed by bundles of carcinoma reticulare of the breast, as they appear after the globules are removed.—(From Vogel after Müller.)

The larger and coarser filaments and lamellæ of this tissue become converted into dense and firm ligamentous bands, which intersect each other in various directions, and are, moreover, connected again by intercrossings of the thickened portions of the remaining filaments or fibres. Into the cells or interstices of the matrix, thus constituted, an effusion from the capillaries of the elementary fibrin or blastema occurs, which is afterwards coagulated and indurated into a hard cartilaginous or fibro-cartilaginous-looking substance. It crackles under the knife like true cartilage, and the section presents a hard pearly or bluish-white amorphous substance, intersected in all directions by the dense ligamentous bands of which we have just spoken. When the mass has been cut through in some directions, it will occasionally present the radiated or stellated bands diverging from a common centre, as has been described by authors. But more frequently, the course of the intersecting bands cannot be traced in any particular direction. There can be no doubt, however, that they often extend to some distance beyond the periphery of the tumor, as it can be felt externally, so as to involve to some extent, the surrounding textures. Although these bands are not supposed to possess of themselves malignant qualities, still they actually do influence the neighboring healthy parts so as

to reproduce the disease in them after an incomplete extirpation of the central tumor. When the deposit occurs in a conglobate gland, however, or in any other part which is enveloped by a distinct capsule, which, in some degree, isolates it from the surrounding textures, this extension of the intersecting fibrous bands is not witnessed, and the common operation for extirpation is more likely to prove efficient. But in the conglomerate glands, especially in the female mamma, and in the skin and glandular portions of the mucous membranes, such an extension of what are vulgarly called the roots or radicles of the disease, is very apt to occur, and should always be anticipated by the surgeon. These are the ramifications to which the action of caustic plasters in the hands of empirics is supposed to extend, even quite beyond the reach of a scalpel or bistoury. The popular delusion, however, upon this subject has cost many a wretched patient a serious abridgment of her term of life, and often brings that brief remnant to an exceedingly painful conclusion.

Vogel, and some other writers, describe a second kind of fibres in the substance of scirrhous tumors, which are identical with the elastic tissue or the nucleated fibres of Henle. These, however, are never abundant, and are never collected in large masses. They appear in a "reticulated form, cross-barred, or in irregular meshes." They are distinguished from the first mentioned whitish or ligamentous intersecting bands, by being insoluble in acetic acid. The former species are much more abundant, and frequently make up the chief mass of the tumor so as perfectly to resemble common fibrous tumors. Indeed it is often impossible to distinguish by the naked eye, and sometimes even by the microscope, on an inspection of sections of the mass removed by an operation, whether a cancerous or mere fibrous tumor had existed. The microscope will occasionally detect only very small portions of heterologous matter in a few of the interspaces, when all the other parts of the tumor are free from it. This prevailing kind of fibre in cancerous tumors is always marked by becoming pale or transparent on the addition of acetic acid under the microscope. It is also soluble in masses when macerated for a time in acetic acid.

Cancerous tumors, as well as the fibrous and enchondromatous, are remarkably deficient in blood-vessels. Sometimes there appears to be no vascularity, so that one would suppose they must have been nourished merely by imbibition. When, however, cancers

ulcerate open, and granulations form, the morbid granulations are highly vascular. The injected parts are then chiefly supplied by the superficial arteries, and not entirely from an increased vascularity of the substance of the tumors. Although the cancerous granulations appear so vascular as to bleed readily on very slight handling, they readily soften down and become disintegrated, and after a very brief existence, they fail of contributing anything towards the formation of a new or persistent tissue. They soon become hard and irregular, and project in fungous masses, and frequently perish or slough away in consequence, as is supposed, of being infiltrated with cancerous matter. But then any low degree of vitality may rather depend on their deficient supply of blood from the direct circulation through the indurated parts below.

The dense, firm, bluish-white, or yellowish and amorphous-looking substance which fills the interstices of the matrix, or fibrous portion, is not true cartilage, as has been commonly supposed. It is rendered transparent by acetic acid, and by ammonia, and other caustic alkalies, and is clearly identical, at least, in a chemical respect, with the pure elementary fibrin,* of which all plastic exhalations are composed. This, although at first secreted, or rather exhaled, in a fluid state, and probably clear of all admixture with serum,

* Most writers, however, agree with Müller in the opinion that all malignant growths are composed chiefly of albumen. But I have yet to learn that this protein substance can ever become the direct element of organization. The parallel drawn from the egg and impregnated ovum, is not a just one when drawn in favor of this opinion, because the albuminous parts of those compounds only serve as pabula for the germinal parts when organization begins. The whole egg does not become organized, nor does the whole of the transparent liquid in the ovum. As the animated cicatricula enlarges, and assumes organization and vital actions, it takes up and appropriates the albuminous remains for its nourishment. The question is, however, of no great importance, even in a chemical point of view, because the protein compounds can be very easily converted into each other by the organic reactions. Much of what was at first pure fibrin in the effused blastema, may afterwards be converted into albumen by the subsequent growth of the cells and nuclei, or corpuscles. It may be laid down as an absolute proposition, that the presence of fibrin is always necessary to the powers of a blastema in the way of developing either cell growth or vascular formations. Who ever saw the albuminous fluid or serum of common dropsy giving rise to any kind of organization? The same question may be asked in regard to the casein fluid, milk. Fibrin must always be exhaled, even before pus can be formed. Most pathologists even think that pus is wholly made up of broken up and altered fibrin.

acquires its peculiar solidity by coagulation, after which it is thought by most of the cell advocates, that the peculiar cancer cells or fibres, which constitute the malignant character of the disease, are developed. Some, however, appear to think that the cancer cells may be formed in the exposed lymph before its coagulation, and some even have believed in their existence in the form of pre-existing germs in the circulation itself. We need not discuss these fanciful views, however, at great length, because the weight of authority is altogether against the last of the above conclusions, and it is very difficult to conceive of the possibility of any investigator getting access to the effused fibrin in the meshes of a cancerous mass, just before, or immediately after, its coagulation. All that can ever have been demonstrated by the microscope, must have been taken from the interior of extirpated tumors, after they have advanced, at least to a considerable extent, in the process of development.* The only diversities in the appearance of recent sections of cancers which have been clearly described, consist in some presenting the cancer cells and fibrous corpuscles and fibres in greater abundance than others, or as interspersed in greater or less redundance of the amorphous cyto-blastema (indurated lymph). Some have stated that they could discover no remains of the latter material or matrix, while others assert, that in some specimens they could perceive nothing but the amorphous blastema, without any interstitial development of cells. Whenever, therefore, we extirpate a suspicious tumor in the early stages of its growth, and perhaps at any time before its full development into softening and relaxa-

* [Since receiving the proofs of the last few pages, I have noticed in the last number of "*Ranking's Half-Yearly Abstract*," the following:

"*M. Kün's New Instrument for the Diagnosis of Tumors.*—M. Kün, Professor of Physiology in Strasbourg, presented to the Medical Society of that city an instrument, the application of which is likely to produce the most beneficial results in the diagnosis of various kinds of tumor. It consists in an exploring needle, having at its extremity a small depression with cutting edges. On plunging this instrument into a tumor to any depth, we can extract a minute portion of the tissue of which its various layers are composed. In this manner a microscopic examination of the tumor can be practised on the living subject, and its nature ascertained before having recourse to an operation. We have proved the utility of this method of diagnosis on these occasions, and seen conscientious practitioners renounce an operation previously determined on when the cancerous nature of the tumor has been demonstrated by the microscope.—*Monthly Journ. of Med. Sci.*, May, 1847.—Ed.]

tion, we may find some difficulty in making out its perfect diagnosis, even by the aid of a microscope.

The amorphous cyto-blastema, which can hardly be distinguished from simple fibrous or enchondromatous growths at first, may not have begun to form any included cancer-cells or corpuscles before the time of extirpation, and according to the microscopical theory, the tumor has only acquired a predisposition to the development of true cancer.

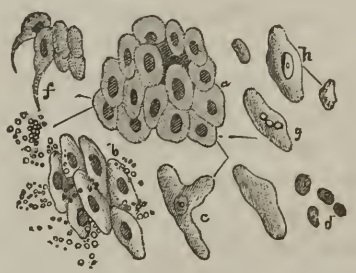
Now all this uncertainty will appear nonsensical enough to the mind of a practical surgeon, who is accustomed to judge of the character of a tumor from its external appearance, sensations imparted to his touch, the presence and character of pains, and such other symptoms as we shall describe in our practical chapter upon this subject. But we will not refuse to gather all the advantages which can be drawn from the microscope; and we will therefore set down all the appearances as they have been demonstrated.

The prevalent opinion entertained by the exclusive readers of journals and other loose periodicals, that there is a single and peculiar variety of cell formation entitled to the epithet *cancer-cell*, is as great a mistake as was the idea that some peculiar chemical constituent of animal or vegetable matter could be detected in these tumors, and also, of a general zymosis in the circulation. Instead of there being any one form of cancer-cells, there are several, at least five or six distinct modifications, some of which differ remarkably from each other, as well as from the natural cells of healthy structures. Vogel expressly states that it is impossible to decide upon the existence of cancer in any case from the appearance of any one or more kinds of morbidly constituted cells. To render it certain that any preparation is truly cancerous, he thinks all the effete or transition class of cells must all be present in the field of the microscope. These, again, are mixed with a smaller proportion of regular or persistent cells, which are intended to become a part of the homologous growth of fibres or intersecting bands, and are, therefore, called fibre or developmental cells. These belong to the reproductive class, and being derived from freshly elaborated protein food, tend constantly to maintain the growth and renewal of all the respective natural tissues. But the transition cells are supposed to be composed of the old and effete or worn out particles that have been rejected from the organism, and are intended to be cast out of the system through the me-

dium of the urinary, bilious and other secretions. "They do not remain connected with each other, but separate, and are either discharged as foreign matter from the organism, or when this does not or cannot happen, being capable of no further development," (into normal tissues Vogel should have said,) "gradually break up, until they are at last reduced to a nearly structureless, finely granular mass, which (like any other mass incapable of acting as a cytoblastema), gradually separates, as far as it is possible, from the fluids of the body, and at last, for the most part or entirely disappears." "A large number of morbid products fall under this head, for instance, pus, and what are termed malignant epigeneses, such as tubercle, encephaloid and scirrhus," &c.

The principal forms of transitory cells which enter into the composition of cancerous growths are: 1st, the irregularly caudate, or ramifying cells; 2d, larger cells filled with nuclei (from two to twenty or more parent cells with young cells); and 3d, cells filled and covered with granules—*granular cells*. Besides these, Vogel as carefully describes, 4th, cells with a very thick wall, exhibiting a double contour; 5th, *double cells*, formed either by the division of one or the fusion of two cells; and occasionally, 6th, cells of various forms and sizes enclosing dark (generally black), granular pigment —*pigment cells;* 7th, the persistent or fibre cells formed in cancer, are fusiform cells, prolonged in the same axis in both directions, such as occur in the development of areolar tissue, and of simple muscular fibre. They occur for the most part in the firm, rarely

Fig. 11.



Microscopic appearance of scirrhus, (220 diameters.)

Small masses that had been pared from a recent section of the tumor, and moistened in water, consisted entirely of an accumulation of cells. These were very pale, varying in size and form, being sometimes roundish (*a*), sometimes oval (*b*), or caudate (*f*), or again of entirely irregular form. The greater number exhibited nuclei (*a*, *b*), and in some a nucleolus was visible in the nucleus (*c*, *h*); few were devoid of nuclei; on some, fat globules were observed (*g*). Between these cells there were perceived nuclei with or without nucleoli (*d*).—(Vogel).

in the soft forms of cancer. They are evidently, therefore, destined for the formation of the areolar tissue, and the intersecting fibrous bands.

In addition to all these, there appear in cancers numerous molecular granules of amorphous particles of broken-down lymph and fat, and also large fat granules and globules. The crystals of calcareous salts, which happen in some other tumors, rarely appear in cancers. Another element, however, more frequently occurs, which, indeed, is seldom altogether absent, and often occurs in considerable quantities—a viscid, gelatinous fluid, like the collonema of Müller, or the gelatiniform collections of other authors. This is said to be composed chiefly of mucin or pyin, although it is generally supposed to be the result of a mere softening down of the originally indurated parts. It is an undetermined matter, however, as yet, among pathologists. We may set it down, along with fat globules, as one of the adventitious and not essential formations in cancer.

From a careful consideration of all these elements and accidental developments in cancer, it must be evident how the different forms and varieties of the disease differ from each other respectively. Accordingly as one or other of the elements predominates, or as they are all intermixed with each other in various proportions, the complexion and character of each individual case will be presented to us. Moreover, the difference in the composition and arrangement of the fibrous or cellular matrix, (the parent structure of Vogel,) will manifest corresponding variations in the feel and appearance, as well as in the organization of the tumor. The ultimate progress of every tumor also, and especially its final tendency to softening and ulceration or sloughing, will afford a still further cause of diversity in the character of all.

The knots or tubercles which sometimes form in the interior of a cancerous mass, but more often project from the surface, so as to be felt externally, are found to be the result of masses of larger cells filled with nucleoli, and conglomerated together, around which the outer tubercles become converted into a fibrous envelop. Similar tubercles also form in the skin over and around cancerous tumors, especially in the female breast, and the same kind generally form in the cicatrix or along its borders, and evince the return of the disease after an operation. Indeed, the different forms of cancer cells independent of the molecular granules, are frequently deposited in the common cellular tissue independently of a pre-existing amor-

phous blastema. It may be that in such cases a small drop of lymph is first deposited and afterwards becomes developed into cancer cells, in consequence of a general morbid predisposition of the solids; but such affections go to prove that the blood-vessels can directly secrete the cancerous matter. Laugenback's repeated successful experiments of injecting cancerous matter into the veins of dogs, and producing a secondary form of the disease in their lungs, would appear to favor this idea, although a different explanation has been offered. It has been conceived that, when a cancer is extended throughout the system in this way, or by the means of absorption from softened-down or ulcerated masses, the cells are arrested in some of the finer capillaries and become developed there by a morbid cell-growth into new tumors. But this is in opposition to the idea we have quoted from the best pathologists, that the morbid or transitory cells are never intended for nutrition of any kind, and are merely productive of cancers, because they are arrested in their place of formation, and cannot be discharged from the body by any of the natural emunctories.

That secondary developments of cancer on other parts of the body, as well as in the interior among the vital organs, are more common after the original tumor has ulcerated, there can be no dispute; but still this fact does not prove the propagation from absorption exclusively, because the same affections, instead of proving sequelæ, often accompany the primary appearance of the disease. They are found to exist also in many cases where post-mortem examinations are made of patients who die before any degree of ulceration has occurred. Cancerous cachexia, moreover, is not produced from absorption merely, because we often meet with it in the first stage of the local disease, and after its appearance.

The primary defect in assimilation and nutrition, as well as the diminished energy of the nervous system, evidently contributes more than any contamination of the blood alone, to the production of cancers. The influence of grief and the other depressing passions is explicable on the same foundation. No good pathologist can refuse to admit the solids for their share of influence over the development and final progress of all malignant growths.

As to what produces the gradual softening down of fully developed cancerous tumors, it is impossible to decide with any degree of accuracy or satisfaction. The cell advocates content themselves with supposing that the larger cells burst and discharge their nu-

cleoli and granules, and thus gradually convert the solid into fluid parts. Others gratify themselves by comparing the process to the supposed conversion of solid blastema into pus; while some get over the difficulty by bringing in the analogy of rotting or softening down of fruits and vegetable roots. More likely it is owing to the entire loss of circulation, and of course vitality* in some of the indurated parts, from pressure or obstruction. We have spoken of the same thing as occurring in larger fibrous and enchondromatous tumors, and managed to get on very well then, without calling in the aid of cells or rotten apples for analogies.

The process of softening usually begins in numerous small points which become filled with a pulpy or puriform matter, and finally coalesce into large excavations or cavities, over which the skin gradually ulcerates or sloughs away, and thus converts the occult into an open cancer or carcinoma.

The softened cancerous matter soon undergoes chemical changes, becomes mixed with blood, putrefies, and becomes acrid, exceedingly fetid† and ichorous. Before the occurrence of the putrefactive and ichorous discharge, the softening is confined to the granular and cellular portions of the tumor, but afterwards the fibres or intersecting bands and vessels which naturally have no tendency to soften, begin to undergo putrefaction and disintegration by the gradual influence of the acrid ichor which comes in contact with them. A section of a large scirrho-cancer in this case will present large irregular cavities filled with ichor, with hard cartilaginous or fibrous partitions and intersections, often partly decayed or corroded. The

* The opinion of some pathologists has been that the original development of the disease, as well as the subsequent softening down of its structure, is owing to a varicose state of the capillaries. A varicose state of these independent little tubes, however, almost necessarily involves a paralysis of them, and that is equivalent to an almost complete obstruction to their circulating powers.

† "Although a scirrhus may remain for months and even for years in a quiet state, without advancing to ulceration, the disease mostly ulcerates before the new formation has acquired great bulk. A large chasm is thus commonly produced, partly by a sloughing, and partly by an ulcerative process, and an excoriating, peculiarly fetid ichor is discharged, often in such abundance as to excite suspicion in a person not accustomed to the view of this fatal disease. Its smell, also, is so different, so much more offensive than any other kind of discharge, that, when once acquainted with it, a surgeon never forgets it, and would afterwards recognize the presence of a patient with cancer, though out of his sight."—*S. Cooper.*

blood-vessels ramifying among these fibres often become corroded also, and effuse blood sometimes in alarming quantities. If there is no considerable hemorrhage, the exposed surface not only appears jagged or corroded, but it is rendered tawny and discolored by the stains of blood which often collect in putrefying clots. The edges of the opening rapidly extend, and become thick and jagged, sometimes undermined and inverted, at other times smaller and everted. The pale and flabby granulations which sometimes form, rarely exhibit any tendency to cicatrization, and then it is only from the sound portions of the skin that they form. Those which shoot up from the exposed surface, soon become infiltrated with the cancerous matter, and afterwards slough or perish away. Indeed, sometimes the whole mass will lose its vitality, and slough altogether away, to the entire relief of the patient, and this fact, although of rare occurrence, has given countenance to the attempts of empirics who pursue the trade of destroying cancers by slow escharotics. The general result, however, is that the ulceration extends with excessive pain and irritation, a spreading erysipelas is diffused widely around, and the skin often becomes extensively indurated and thickened, as if infiltrated with cancerous matter, the glands and viscera become contaminated, and the constitution sinks under increasing irritation of hectic and exhaustion.

Although we have given a sufficiently minute history of the internal composition and progress of this disease, we have yet to point out the external means of diagnosis, by which alone we can be made aware of the nature of a cancerous tumor before its extirpation from the living, or its deposition in the dead body. There is, in addition to the characteristic stony hardness and weight of the mass, a peculiar darting or lancinating pain, of an intermitting or neuralgic type—generally compared by the patient to the pricking of needles, or the sudden passage of a lancet through the tumor. These darting or shooting sensations by no means invariably follow the course of the nerves which supply the affected parts. On the contrary, they often run transversely across, or in some very different direction from the nervous filaments, so that they must be ranked under the head of preternatural sensibility, like those which occur in inflamed fibrous tissues to which no nerves seem to be distributed.

The appearance of the superincumbent integuments differs according to the depth and location of the tumor. In every situation where the disease begins deep among the soft parts, the skin is very

late in becoming affected, and in some cases exhibits no connection with the disease before the death of the patient.* In more superficial affections, however, the skin early contracts adhesions to the tumor, and becomes thin, glossy, and dusky or livid, and finally appears to be fully incorporated with the disease. It is often, moreover, puckered or wrinkled into hard and persistent folds. Fissures occasionally form in the centre, which ulcerate, and present the jagged and everted or undermined edges of malignant disintegration, even before the formation of external tubercles, or any degree of subjacent softening. When the disease occurs in the female mamma, the nipple by this time begins to decay, having, in general, been previously retracted by the shriveling and obliteration of the excretory ducts concentrating within it. As the hardness increases in size, the cellular and adipose matters around and underneath, generally disappear, either by absorption or incorporation with the disease, and finally the tumor obtains strict adhesions with the parts below as well as to the skin above.† This will especially be the case when the fibrous or intersecting bands extend into the surrounding textures beyond the periphery of the actual tumor. Finally, the disease becomes incorporated with the fascia and muscles around and below, and even with the fibrous envelops of the bones and cartilages. The very bones themselves, in some rare cases, become interstitially involved with the disease. When‡ the female mamma or

* "The difference in the feel of scirrhi materially depends upon the quantity of fat around them; if much of the adipose substance be absorbed, the irregular knotty form of the disease will be felt, but when a good deal of fat remains, the breast seems very large, full and smooth, streaked, perhaps, with blue dilated veins, and having sometimes an ulcerated aperture in the centre." *S. Cooper.*

† This disposition to shriveling and contraction of the surrounding cellular tissue and skin, is one of the most striking traits of genuine cancer. It sometimes astonishes me to behold the enormous gaping wound which results from the extraction of a moderate sized tumor. The moment the constricting bands of cellular fibres have been divided, the edges of the wound retract widely asunder, and it proves very difficult to approximate them in the other dressing. Justamond regarded this as the most decisive sign of the true occult cancer, and thought the disease much more likely to return after this than from the opposite or relaxed condition of the surrounding parts.

‡ "In persons who have long suffered from carcinoma, portions of the natural structure of the bones are frequently absorbed, and a scirrhous substance is deposited in their place. The fact is sometimes exemplified in the ribs and sternum, and we have in the Museum of the London University, the upper part of

any other part around the walls of the thorax has been originally affected, the disease sometimes extends through the medium of the fibrous tissues or the lymphatics, to the interior surface of the great cavity below, and of course passes entirely out of the reach of surgery. But the most common and serious mode of extension is through the medium of the external lymphatics. The vessels them-

Fig. 12.

Female mamma and axillary glands extirpated for scirrhus.

a cranium taken from a person who died of cancer of the breast, and illustrating the secondary effects of the disease on the parietal bones." Mr. Cooper goes on to state, that he attended one patient whose rib and thigh bone underwent spontaneous fracture before his death, from a carcinoma of the bladder; but he unfortunately does not relate the character of the disease of the bones. I have alluded to the eburneous and sometimes radiated or striated appearance of the outer surface of bones situated near to cancers, and I have also repeatedly seen the bones wasted away from the pressure of cancers by an irregular absorption. Once, two of the cartilages of the ribs had become partly carious,

selves often become indurated and thickened like wires, but more frequently the nearest ganglia become enlarged and finally reduplicate the disease in its worst forms. These consecutive, or secondary, tumors generally remain isolated from each other, but they sometimes become agglomerated together in large masses, and preserve the same course of softening down and malignant ulceration as the original tumor. They sometimes, indeed, become the primary seat of the disease, without affording any suspicion of propagation by absorption or sympathetic influence.* It will not be correct, however, to pronounce every case of lymphatic enlargement a secondary development of the original cancer, because they are often merely enlarged from common irritation, and do not for a long time afterwards receive any deposition of the cancerous matter within their texture. Many tumors of this kind disappear shortly on extirpation of the original disease, and cannot, therefore, be suspected to have been malignant. When they are truly morbid, they usually become stony to the feel, as well as enlarged, like the primary cancer itself, but they rarely send out prolongations of their intersecting fibrous bands beyond their enveloping capsules of cellular substance, and can therefore be extirpated with a small extent of incisions. Instead of becoming scirrhous or indurated after contamination with the can-

and partly necrosed, but they had previously undergone a partial ossification from old age. I suspect that the fungoid disease is just as apt to affect the bones with different states of the disease, as the true carcinoma. I met with one case of a man, twenty-eight years old, whose whole humerus was eburneous and apparently solid throughout, from a medullary growth beginning at the wrist. Although it was so solid as to shiver my saw when I undertook to cut through it, during amputation, it proved to be so brittle as to snap across, the instant I pressed it against my knee, while I held it between my hands.

* "It is not to be supposed, however, that lymphatic glands are not sometimes the primary seat of cancer. In fact, sometimes the scirrhous cancer, and in other instances, the fungoid, or medullary cancer commences in them. Mr. M. W. Smith, in some interesting remarks annexed to a case of this description, expresses his belief that when carcinoma begins in the axillary glands, and the breast is only affected secondarily, the cases are more rapid in their progress, and more fatal in their termination, than those in which the disease of the lymphatic glands follows that of the breast."—*S. Cooper.* The worst cases of lymphatic enlargements are those which produce excessive œdema of the neighboring parts, especially of the adjacent extremities. A sense of numbness of one of the arms, accompanying a general œdema of its whole substance, indicates that the axillary nerves are disturbed by pressure, if not by contamination, at the same time that the whole assemblage of axillary lymphatic trunks is involved in the disease.

cer cells, they often present a soft, friable, or granular appearance, and are even sometimes distinctly medullary in their constitution. This fact goes to prove the identity now generally believed in by pathologists, between cancer and medullary fungus.

When cancer makes its primary appearance on the skin, and mucous surfaces of the lips, tongue, and other similar parts, it generally commences in the form of an indurated tubercle or lump, in which the characteristic prickling or lancinating pains are felt. Sometimes the first appearance is in the form of a discolored spot or point, or of a hard, dusky or warty scab—which repeatedly falls off, or rather is pulled off, and leaves an elevated raw surface exposed, in which cancerous ulceration finally supervenes:* occasionally ragged warts appear with an induration beneath, which eventually run into the same malignant ulceration. The lymphatic ganglia along the course of the involved lymphatics, become afterwards affected in the same way as we have described in cancers of the mammary and other glands. Lupus of the nose and face frequently follows the same course, although its structure is granular and friable, so as to be classed in general with the encephaloid disease. The majority of what are called cancers of the eye, are also of the latter class; although where few instances have occurred of irregular and indurated enlargements of the lids, especially near the inner canthus and the caruncula lachrymalis, which have turned out to be genuine carcinomata, cancers of the penis, scrotum, rectum, and the external female organs are of very rare occurrence; but they generally begin in the form of painful tubercles or warts, and prove exceedingly intractable in their character. The painful and stony indurations of the testes, when they prove truly scir-

* The public have a strong prejudice against every little pimple or crust about the nose and face, occurring in the latter periods of life, which arises from the frequency of their conversion into intractable ulcer or noli me tangere, which they all generally consider to be cancerous, as we have said before; also the various non-malignant tumors and sores may assume the cancerous action under the influence of peculiar states of the constitution. We often meet with females who have had small and innocent lumps in the breast for years, without having been at all troubled by them, but after the loss of a husband or favorite child, the disease will acquire malignancy in consequence of mere grief. Pecuniary embarrassment, or any other cause of depressing emotions, and loss of the general health from indigestion or close confinement, will also contribute to convert simple growths into cancerous mass.

rhous,* are peculiarly disposed to travel up the source of the vas deferens, and to affect the internal lymphatic ganglia before an attempt at extirpation can be thought of, and therefore render the operation hopeless. Secondary and even primary developments of the disease in the liver, spleen, or lungs, and sometimes even of the omentum and intestines are apt to form at the same time, and prove to us after death the impossibility of cure by any known plan of treatment. In such cases, the internal tubercles, although hard and irregular, are generally yellowish, and made up of a granular cancerous matter, among the interstices of which the fibrous substance is scarcely manifested.

Although the constitutional treatment of carcinoma usually resorted to by the profession, consists chiefly of alteratives and tonics, a considerable variation from this course is frequently required in particular cases. In the earlier stages, before the peculiar cachexia has been manifested, it is always best to alleviate the irritation by a well regulated diet, combined with laxatives and occasional diaphoretics. As long as there is any degree of plethora, or vascular excitement present, it will be best to confine our patients to vegetables, farinaceous food, and milk diluted with water. Great attention to cleanliness, and warm clothing, should always be observed. The flannels should be changed and aired every night and morning, and ablutions with warm water should be practised every morning before putting on the dress. Often great benefit will be derived from a general sponging with warm water acidulated with nitro-muriatic acid, followed by frictions before retiring to bed at night. By such means the cutaneous transpiration will be constantly main-

* I have never extirpated but two genuine carcinomatous testicles, one of which was from a gentleman near Norfolk, and the other from a German farmer near Frederickton, Maryland. They were very hard and knotted, livid and painful, and although no signs of disease in other parts of the corda, appeared at the time, except a slight hardness and enlargement of the vas deferens at each cord, the disease returned in both cases within eighteen months, in the internal iliac ganglia. In the Maryland case, I extirpated a return in the groin of a large tumor in 16 months after the first operation, but the superior iliac glands showed themselves in a similar state of disease before he had fairly recovered from the last operation. It happened in both these cases, that the secondary tumors were all medullary in their character, thus proving the strong family likeness, if not identity, of cancer and encephaloid disease. All my other cases of extirpation of the testes were either for encephaloid growths in which my success proved very indifferent, or for enchondromatous or fibrous growths which were not followed by returns of the disease.

tained in a state of healthy vigor, which is most essential to the counteraction of all malignant growths. After the constitution has begun to flag, and the symptoms of cachexia have supervened, the use of light and digestible animal food will be required in combination with the farinacea, and the vegetable tonics. If any tendency to anemia, however, be manifested, chalybeates will become the best invigorators. The carbonate of iron* in full doses, combined with small proportions of rhubarb and ginger, or aloes, will in general prove the best formulæ. The use of the iodide of iron and sarsaparilla is very much depended on by some of our practitioners, and many push the iodide of potassium to an unwarrantable extent. In general, the preparations of iodine are found to excite the local as well as the general irritation, and are by no means so innocuous as in common scrofula. When the pain and irritation are very distressing, opiates must be resorted to, and in general, it is best to give them in combination with diaphoretics. Sometimes the miserable patients, in hopeless cases, require enormous and increasing doses of opium to ease their passage to the grave; hyoscyamus and the other narcotics may occasionally be substituted with advantage for the opium.† Mercurials in general should be avoided,

* The preparations of iron have always been favorite remedies for the cachectic condition of the system accompanying cancers. Justamond gave the *flores martiales* (the ammonio-chloride of iron) in enormous doses, while he was applying a similar preparation topically to the ulcerated surfaces. Carmichael has long been addicted to the use of chalybeates under all the circumstances of this disease. I have heard of several reported cures performed by a long course of iron powders, accompanied by well regulated and gradually increased pressure. I am sorry to say, however, that I have never been able to do more than palliate by mere treatment. The severe pressure originally recommended by Young, of London, has more often done harm than good. I always prefer a very moderate pressure so as to support the tumor, and prevent it from becoming pendulous, or receiving an undue pressure of blood.

[† The recently introduced preparation of the *chloroform* is particularly applicable in these and similar cases, and may be administered either internally or by means of inhalation—perhaps, for its long continued use, the former method is preferable. I have lately employed it internally in a case of the kind, in doses from forty increased up to eighty drops with the happiest and most beneficial results, and have been so strongly convinced of its efficacy in bilious colic, neuralgia, and other medical cases, as to esteem it one of the most useful and reliable of our internal remedies.

With regard to its inhalation for surgical purposes, though at first disposed to altogether prefer it to sulphuric ether, I have lately seen one or two instances which have caused me to somewhat modify my opinion. The chloroform is

although they may be occasionally necessary as purgatives or alteratives.

The palliative local treatment consists in the application of leeches from time to time to allay vascular engorgement and irritation, the use of cooling and astringent lotions at first, and of mild sedative plasters afterwards. Whenever the surface over suspicious tumors appears injected, or preternaturally vascular, cooling and evaporating lotions and emollients, such as lead water, the mucilage of slippery elm bark, of flax seed, or quince seeds, should be continued until all signs of engorgement and local determination of blood disappear. Every attempt at discussion of the tumor by counter-irritants or excitants will then prove injurious, for no matter what may be our opinion in regard to the essential nature of cancerous growths, there can be no doubt of the fact, that local hyperæmia always favors the rapidity of their development. The repeated use of purgatives and antimonials with diluent drinks, will contribute amazingly to assist such topical applications in relieving the acute stage or progress of the disease. After a check has thus been made to the activity of all vascular impulse, or in the commencement of such cases as are not attended by excitement, mild and unirritating discutient or sedative plasters, (such as the empl. lithargyri cum saponis, or empl. hydrargyri cum ex. belladonnæ, spread on kid skin,) applied extensively over the whole region so as to protect the parts from the irritation of handling, and of unequal pressure, and also from vicissitudes of temperature, will be the appropriate applications. The progress of most tumors can be considerably checked, at least, by these means; and in all cases which are not absolutely malignant, we may even hope to effect a complete dispersion of the unnatural mass. We are occasionally gratified by finding, after such treatment, that our first suspicions of a cancerous tendency have been unfounded. Symptoms are sometimes

decidedly the most powerful of the two agents, and so sudden in its effects as to require great caution in its administration, especially to children. From a recent case in which convulsions supervened on giving it to a child, I am inclined to question, whether the more gradual and easily controlled application of the sulphuric ether would not be less objectionable in some cases. But of the many times I have myself used it and seen it used, I have met with bad effects in but two instances, and these fortunately passed off without causing any injury to the patient. When properly administered, and with due caution, these two anæsthetic agents will prove perhaps the greatest blessings that have yet been bestowed upon suffering humanity.—Ed.]

fallacious, and mere fibrous growths are occasionally complicated with such shooting pains and hardness, as to deceive the best practitioners.* The advice which many authors have given in favor of an immediate operation on the first appearance of suspicious tumors, is by no means judicious. By following it, we shall not only incur the hazard of subjecting our patient to unnecessary suffering, but we shall be also driven to operate under the most unfavorable circumstances. The vascular excitement which accompanies the early stage of most glandular tumors is never propitious to surgical operations, even in simple growths, and when encountered in a real malignant case, it always favors the speedy return of the disease. Before we can hope to operate successfully, we must always be satisfied that the constitution has been enabled, in some measure, to check the progress of the growth. It is not the acute and rapidly progressing class of cases that we radically cure by our operations, but, on the contrary, the older and comparatively chronic forms of the disease, around which nature has been able, as it were, to set up a barrier, and thus to demonstrate their defect of constitutional origin.† Too many of our profession have taken up a prejudice against the possibility of affording relief to cancers, either by con-

* About three years ago, I had two cases of suspicious tumors of the female mamma, in the same family connection in this city. One was an elderly lady of 53 years of age, the wife of a retired merchant, and the other a younger lady of about 25 years, the wife of a near relative of the former. These were both hard and painful tumors, near the nipples, and caused great alarm in the respective families, because repeated instances of fatal cancers had occurred in former years among the female relatives of both parties. I applied mercurial plasters with belladonna to both these tumors, and gave purgative pills every other night, of colocynth and prot. iodid. of mercury. The compound syrup of sarsaparilla, and hydriodate of potass, were also given three times a day with diluents, and a rigid enforcement of farinaceous and vegetable diet required. I had the pleasure of witnessing a rapid dispersion of both these tumors, and in less than three months, dismissed them both cured. This practice has often proved successful in cases which I never suspected to be anything else than common irritable tumors of the conglomerate glands.

† I have mislaid an excellent old work on carcinoma, by Johnston of some one of the secondary English cities, (I think of Norwich,) which contains some excellent remarks upon this subject. He contends very strongly for the principle I have laid down in the above text. I give several cases in point. Whenever he operated for rapidly progressing cancers, they always returned in a short time with increased malignity, whereas most of the cases which had become stationary before his operations, did well, and never returned.

stitutional or local treatment.* They give thereby a great advantage to the empirics and nostrum venders, and throw their suffering patients upon the pretended mercy of impostors. Even the protracted and horrible stages of open or ulcerated carcinoma, may sometimes be greatly relieved by judicious treatment, and testimony is not wanting, in the most authentic records of surgery, of cures having been effected under such circumstances. Almost the whole profession in London once bore witness to the astonishing palliations, if not cures, of the benevolent Justamond, even after enormous ulcerated masses of genuine cancer of the female breast had brought their patients to the verge of the grave.† Sometimes the system appears

* "We should consider, further," (said Dr. Musgrave, in his Gulstonian lecture,) "that to set limits to nature, to know with certainty that any particular disorder is incurable, exceeds the bounds of human faculties. It is therefore our duty, that is, the duty of those who cultivate the study of medicine, never to suffer *hope to be totally extinguished, because the extinction of hope is the extinction of endeavor.*"

† Justamond was an eminent surgeon in London, about the time of the Hunters, an F. R. S., and surgeon to the Westminster Hospital, who devoted much of his time to the especial treatment of cancers. He reformed the practice of his predecessors Guy and Sare, and introduced new and milder caustics for the radical cure of cancers. He gives a very interesting case of genuine stubborn scirrhus of the mamma, of the size of an apple, which he caused to drop out entire as a nut from the shell, by repeated applications of a powder composed of one-third part of antimony, and two-thirds of white arsenic mixed with an equal part of powdered opium. He mixed this with the white of eggs, and applied it in the form of a plaster over the surface of the tumor, which had previously been blistered by the application of lunar caustic. The pain was very great for the first twenty-four hours, but afterwards subsided. A crack formed around the tumor, which he filled every day with the plaster, and in a month the whole mass came out clean, and the ulcer speedily healed. An enlarged gland in the axilla remained stationary for two years afterwards, and the patient considered herself cured.

But the most remarkable cures of Justamond were performed in old ulcerated or open cancers. He employed the *flores martiáles* in large quantities, in the form of pills (60 to 120 grains, and even one ounce a day), and an escharotic or counter-irritating wash composed of the muriate of ammonia and sulphate of iron; with an occasional application of arsenic and sulphur powders over the foul surface. He also used the hemlock, both so famed in Germany, (a strong infusion of conium in the warm bath,) for the relief of the constitutional irritability and pain of severe cases, and also a combination of powdered muriate of ammonia, arum root and crabs' claws, in fine powder, dusted over the ulcerated cancers. He took up the idea that cancers, like the itch, were produced by numerous small insects or animalcules getting into the pores of the skin or orifices of the mammary ducts, and breeding there. Arsenic appeared to him

to have contented itself with the production of a large cancerous tumor, and after a long process of ulceration and discharge, the malignant elements have been wafted out of the circulation. Cancer is a very different disease from medullary fungus in this respect, for its very induration sometimes proves a circumscribing barrier against the further extension of the morbid growth. The condensed fibrinous or enchondromatous matter around, answers the purpose of a cyst to an imbedded bullet within the body; and the disease may, therefore, after having acquired a certain bulk, remain stationary for the remainder of the patient's life. From ten to twenty years of comfortable existence have occasionally been protracted in this way, until, finally, the system has succumbed under some other disease.*

to be the specific poison of these insects, in the same manner that sulphur is the antidote for the acari of itchy patients. But he certainly effected some remarkable cures of the worst description of open cancers, and palliated a great many others under the direct observation of the Hunters and of Cline. He never concealed his method or his treatment.

* I first attended the late Mrs. M—— R——, the mother of the late Dr. G. W. R——, twenty years before her death, with a genuine carcinoma of her left mamma. It continued to progress rapidly for the first eight or ten months, until it had assumed the size of a man's doubled fist. It then softened in the centre near the surface, and ulcerated. The edges of the skin became thickened, jagged and everted, and the base, worm eaten with the characteristic ichorous and offensive discharges. By correcting applications of solutions of chloride of soda, or creasote, occasional mild escharotics to the foul edges, and anodynes and emollients afterwards, I succeeded in checking the progress of this large cancer, and in alleviating the lancinating pains. The disease never afterwards progressed or gave her any serious trouble. Nevertheless, during the last eighteen years of her life, I tapped her about ten times for dropsy of the left ovarium, and performed a successful operation for a hard cataract in one of her eyes, from which she saw so much as to render it unnecessary to operate upon the other during her last eight years. I attributed the extraordinary success of our management of this case, in a great measure, to her extreme cleanliness and delicacy in handling the tumor, and also to her moderation in diet. She lived almost exclusively on milk, vegetables and bread, and always attended most scrupulously to maintaining the regularity of her evacuations. One of the favorite anodyne applications to her tumor, in addition to antiseptic lotions, was the smooth leaf of stramonium, or plantain, with the occasional use of belladonna ointment. I have at present a maiden lady under my care in Christian Street, with a large carcinoma of the right mamma, which I have kept stationary for nine years, during all of which period she has enjoyed tolerable health. Whenever the lancinating pains become troublesome, I give her Dover's powders with calomel or prot. iodid. of mercury at bed time, and apply a plaster of belladonna or aconite over the tumor. Whenever the skin begins to crack or ulcer-

So great, however, are the dread and horror of most patients in relation to the miseries of a death by cancer, that but very few of them will ever remain content with palliative treatment. If we do not recommend the knife, or some more acceptable means of ridding them of the existing tumor, they will be sure to go to the rude and unskillful hands of some advertising pretender, and undergo all the hazards of empiricism. The moment, therefore, we find ourselves clear of the complications of engorgement and vascular irritation, provided other circumstances be favorable to an attempt at the radical cure, it will generally become necessary to decide upon the appropriate course. In a majority of such cases, there can be no question about the propriety of recommending the operation which, if skillfully performed, will leave the most easily cicatrizable wound, and inflict the least agony upon the sufferer. But there are some individuals who cannot bring themselves to undergo the infliction of a cutting operation. The apprehension of hemorrhage is to them far more terrible than the most excruciating pain, and no persuasion can induce them to undergo a trial. In such cases, we occasionally find it necessary to anticipate the cancer doctors in the use of their favorite escharotics, and by judicious and careful management, we can sometimes succeed even to our own satisfaction. If the tumor is situated near the surface, and is moderately circumscribed, as well as detached from the parts below and around, we can hope speedily to destroy its vitality by a variety of caustics.

The vitality of all morbid structures is weaker than that of the surrounding healthy parts, and the same stimulus, therefore, which will merely irritate the latter, may readily prove destructive to the former. On this principle, very powerful caustics are not usually required, and when we resort to them, we always employ them in a state of dilution and combination with narcotics, to relieve the pain incident to their direct action upon the living organization.

ate over the centre of the livid skin, I apply a strong solution of sulphate of iron constantly for several days in succession. By the way, I ought to state that powdered sulphate of iron is the best application to most ulcerated surfaces of carcinomas, and will do more towards effecting cicatrization than any other remedy. Justamond used to apply its equivalent (in his combination of sal ammoniac, oxyd. of iron, and oil of vitriol), to all such surfaces. I once saw a foul fungating surface after an incomplete operation for medullary growth, entirely cleansed out by sloughing away of the morbid parts, and a subsequent granulation of the wound produced, by a few direct applications of the powdered sulphate of iron underneath the dressings of dry lint.

The proper plan is first to remove the cuticle over the surface of the tumor, by the vesication of a common fly blister, or a strong solution of lunar caustic, and afterwards to protect the skin around by the application of an adhesive plaster spread upon a circular piece of leather. A paste or ointment of some slowly acting, but efficient caustic, is then applied over the excoriated surface, and maintained there for several hours by a compress, bound down firmly by a large adhesive plaster and bandage. Sometimes the application has to be repeated from time to time, for the purpose of ensuring a thorough impression, but in superficial growths, one full trial of this kind will prove sufficient. The subsequent and frequently repeated application of emollient poultices combined with narcotics, will mitigate the pain, and promote suppuration around the tumor, and a final detachment of it by ulceration. Sometimes even large tumors will slough away entire in this way, and leave a clean, healthy ulcer, which will afterwards close by a sound cicatrization. The favorite caustics at present employed by our practitioners, are the chloride of zinc mixed in equal proportions with flour or calcined gypsum,*

* About a year ago, a lady, 46 years old, from Montgomery county, applied to me with a large ulcerated carcinoma of the left mamma. The tumor was as large as a goose's egg, and was situated just above the nipple and its areola, with a deep jagged ulcer in its centre, discharging an offensive ichor. As there was nothing but a slight sympathetic enlargement of one of the axillary glands, which subsided under leeching and a mercurial plaster, I proposed the operation. As she had an insurmountable dread of a cutting operation, I proposed the caustic, to which she cheerfully assented, notwithstanding my caution in regard to the unavoidable pain attendant upon the application. I therefore applied the chloride of zinc combined with an equal quantity of powdered gypsum and a small proportion of the sulphate of morphia. The whole of the ulcerated surface was filled with this compound powder, and a compress of dry lint bound down over it by adhesive plaster and bandage. Under the free use of morphia and diaphoretics, followed by the application of emollient poultices, the pain speedily subsided, and in less than a week the whole tumor began to detach itself from the surrounding healthy parts. Two more slight applications around the edges, or rather, I should say, in the surrounding fissure, caused an entire detachment of the tumor. It sloughed away in less than twenty days, and left a perfectly healthy ulcer, which rapidly cicatrized, and she returned home well in about six weeks, and has not since returned to notify me of the final result. This was the largest tumor I ever removed by the caustic. I have removed several smaller ones from the mamma, when they were isolated from the glandular structure of the breast, and also when they were situated in the lymphatic ganglia, in the same way; but I have generally preferred the arsenic paste made with from ten to twenty grains of the arsenious acid to an ounce of morphia cerate, and worn at intervals as long as the patient could tolerate the application.

or the potassa fusa and quick-lime. The white oxide of arsenic with sulphur, or made into an ointment with basilicon or spermaceti, is also frequently employed, and some such combination of this mineral no doubt constitutes the most efficient preparation used by the quacks. They sometimes, however, use the bichloride of mercury, or the ashes of burnt oak bark and other alkaline preparations from the vegetable kingdom, which operate slowly, so as, in their language, gradually to draw out the roots of the disease. Although all of these escharotics necessarily give a vast deal more of pain, and protract it much longer than any surgical operation, still we can alleviate the suffering very much by the internal and topical use of opium at the same time administered, especially if we have placed the system under a favorable condition by previous treatment. How far the poisonous effects derivable from the absorption of the caustic preparations of arsenic and mercury can be obviated by similar combinations, it is impossible to say. All the empirics, however, insist upon it that some one or other of these heterogeneous ingredients invariably counteract absorption at the same time that they mitigate the pain of escharotic influence upon the nerves. Thus Plunket's, the oldest of the detected compound cancer powders, contained the pulverized root of crow-foot combined with equal proportions of arsenious acid and sulphur.* Guy's celebrated caustic, which was afterwards used with great reputation both by

* Dr. Rush's works contain a notice of an arsenical caustic employed by a Dr. Martin, once his favorite pupil, but who afterwards set up the trade of a cancer curer. A late physician of this vicinity, purchased the secret for a large sum of money, and the remedy is still used by some to whom he imparted it. I have had several opportunities of witnessing its effects. It is a slow caustic, and certainly contains arsenic, although they assert that it is wholly composed of cancer herbs and roots. A Mr. Norris uses a similar ointment with some success and considerable reputation here. He leaves with his patients two kinds of salve, one a red one, to draw out the cancer (as he says), and the other a brown one, to sweat them out. The brown salve is nothing but litharge boiled down with linseed oil, and is probably useful as a defensive and soothing plaster after suppuration and ulceration have been established by his strong red ointment. It cannot be denied that lupus and lepoides and cancer warts of the nose, face and lips, have frequently been efficaciously cured by these applications, and I have occasionally imitated the practice with perfect success. In general, however, I prefer altogether the caustic potass in such superficial growths, followed by slippery elm bark or flaxseed poultices. If the cicatrix does not become smooth and healthy, an occasional touch of lunar caustic, or the diluted arsenic paste, will speedily rectify that condition.

the father and son of that name in London, was never explained to the profession. Some authors of that period suggested that it was like Plunket's powder in its composition and effects, while others supposed it to be composed of a combination of corrosive sublimate with euphorbia. Some of the empirics in this country employ the orobanche, and others the pyrola umbellata, either in combination with, or as a preliminary to the use of, their arsenical pastes, for the same purpose. All these plants are acrid and rubefacient in their influence upon the living surfaces, and have been supposed, therefore, to excite such a degree of reaction and centrifugal effort of the capillaries, as may prevent absorption. It is more probable, however, that they favor the deep and speedy impression of the mineral portion of the remedy, by first making a superficial impression upon the skin, and detaching the defensive cuticle. The reason why the corrosive poisons in these combinations do not affect the system more frequently with their specific tendencies, is, that malignant tumors never exhibit, under any circumstances, a strong disposition to absorption. The most powerful measures generally fail in making any impression upon them in the way of diminishing their natural size, because neither lymphatic nor vascular absorption can be excited within them. The chief characteristic of all malignant growths consists in the fact that incessant deposition of useless material is going on, without any corresponding or subsequent removal of the formerly deposited particles, either by the lymphatic or venous capillaries.

The conditions which forbid all attempts at a radical cure by caustics, are nearly the same as those which deter us from the use of the knife. If any part of the diseased structure is so deeply seated, or so firmly attached to important parts, as to be out of the reach of either of these methods, nothing but palliation can be resorted to. In some cases, however, we can safely go to a much greater extent with our incisions, than by the use of any kind of caustic. This will prove to be the case not only with all very large tumors, but also in all cases where the muscles, or nerves and tendons and blood-vessels, are involved. The caustic would then make terrible, and perhaps fatal, havoc among the parts, without perhaps accomplishing the desired object, while the knife could safely separate the disease from some of these parts, and divide portions of others without any danger to life. In very irritable temperaments, moreover, where the protracted suffering from caustics would be likely to

prove overwhelming, the knife can be sometimes expeditiously used with perfect safety, especially since the recent discovery in Boston of the ethereal influence introduced into the system by respiration.

In no case, however, can even the knife be used where there is not an absolute certainty of our being able to extirpate the whole of the existing disease. If the skin is decidedly affected by induration or tuberculous formations around the tumor, or if the lymphatic vessels and ganglia are extensively diseased, it will be madness to operate. The surfaces exposed by the incisions will, in all probability, never heal over, and the disease will return in an exasperated form before the patient has been cheered with a ray of hope. A regular or chronic cough, no matter how slight or easy it may appear; a quickened or irregular respiration, especially if accompanied by a dusky hue of the skin, should always excite our suspicion of an internal development of the disease in the lungs.* Even auscultation and percussion will not prove sure guides for our diagnosis of such cases, for internal scirrhus is slow in destroying the natural sounds and respiratory murmurs of the chest. The disease is not developed like tubercles, in large or entire portions of the lungs at the same time. Instead of occurring at the apex of a lung and solidifying a whole lobule, it generally occurs in isolated patches or nodules, especially near the base of the organs, and leaves the surrounding bronchial cells unobstructed. It is generally, therefore, best to depend on the ordinary rational signs of pulmonary disease in connection with cancer, and always to suspect the internal or secondary development when there is any derangement of function there. The same thing may be said of the liver and spleen. We must not wait for the appearance or feeling of indurated or large tumors in these organs. Whenever the chylopoietic functions are

* I was called into consultation with Drs. Horner and Harris about the case of a very interesting lady of this city, of about 38 years of age. She was afflicted with a decided carcinoma of the left mamma, complicated with numerous small tubercles of the skin and a troublesome cough. Her pulse was rapid, and at first corded, with a hurried respiration. As no decided improvement could be effected by leeches, emollient applications, and diaphoretics, we declined any attempt at the radical cure, and she speedily sank without any great exasperation of the symptoms. On a post-mortem examination by Dr. Horner, the pleura costalis and periosteum of the subjacent ribs were found to be affected as well as both lungs, the bronchial and substernal glands, and the substance of the pectoral and intercostal muscles. There was also an effusion of serum into the cavity of either pleura.

greatly deranged in connection with the external appearance of cancer, and especially in all cases when a decided cachexia is manifested, we should decide that there is the strongest reason for suspecting internal organic disease.* The detection of hard or regular tumors in any of the cavities or interior parts of the body, will always of course decide us positively against the propriety of removing a less important disease from the outer surface. But it is unnecessary to pursue this inquiry further in the present chapter. We have considered at sufficient length a parallel subject under the head of malignant osteo-sarcoma; and we shall find occasion to say more in regard to the propriety of declining to perform operations, in our history of the remaining forms of malignant tumor.

Medullary Cancer, Medullary Sarcoma, Medullary Fungus, Encephaloid Disease, or Soft Cancer. Fungoid Tumor, Fungus Hæmatodes.

The great variety of names which have been given to this disease by different authors, will serve to show the diversity of its forms in different cases, as they occur in practice. They all agree, however, in one common character—the possession of a peculiar soft-

* It repeatedly occurred to me, during the early period of my experience, that patients would not recover from indigestion and marasmus after my apparently successful operations for the extirpation of external cancers and fungous tumors. On post-mortem examination, I almost invariably found scirrhosis of the liver or spleen, or some other of the abdominal viscera in such cases. I recollect one case in which there was a melanotic tumor in the head of the pancreas, and another in one of the superior mesenteric lacteal glands, which had prevented all recovery of flesh and vigor after a successful operation for the removal of an external melanotic tumor in the parotid gland. In another case, after the removal of one large fibrous and a second medullary growth, the patient died of small tubercles over almost the whole surface of the peritoneum and omentum, with numerous larger ones in the liver and spleen. In every case in which I have refused to operate on account of cachexia and marasmus, from indigestion, I have found some development of organic disease within the abdomen. Often the kidneys are affected with degeneration, or tubercles, or some other modification of Bright's disease in such cases, and their condition should never be overlooked in post-mortem examinations. During life, moreover, their condition in this respect should always be inquired into by boiling the urine, or the application of chemical tests. Nothing will so surely prevent a patient from recovering after the shock of a severe operation for cancer or medullary fungus, as organic disease in the kidneys.

ness or yielding of structure, which distinguishes them from scirrho-cancer. They also run a much more rapid course, and generally arrive at a much larger size before they break or burst open externally, by a yielding of the superincumbent parts. They often increase to the size of a man's head, and even sometimes to a much larger dimension. They also derange the general system more speedily and seriously. Indeed, the patient often becomes wan and cachectic before any appearance of the disease. They prove, if possible, more malignant than the true carcinomata, and more rapidly sink the patient into irrecoverable prostration. Perhaps the most striking peculiarity, however, by which they are finally distinguished, is that, after undergoing a comparative softening, they never lose substance by ulceration, but, on the contrary, shoot out fungoid protrusions, and increase more rapidly than before. When these open fungoid masses bleed spontaneously, or are mixed with fresh clots of blood, the disease is perhaps improperly called by another name, i. e. *fungus hæmatodes*. The only difference that can be detected in such cases, from the ordinary forms of the disease, is that there is greater interstitial vascularity, which, of course, allows the ruptured capillaries to discharge greater hemorrhage.

When the interior of such growths is laid open after our operations upon the living, or dissections of the dead body, the structure is found to be soft or soapy, very much like the appearance and consistence of the brain. The softening down of some parts and the induration of others, also bear a close resemblance to ramollissement or induration of the brain in certain diseases of that organ. But there is no real analogy between such masses and the organization or structure of the brain. The chemical composition and the sensible or physical qualities alone are comparable in the two formations. The color of medullary growths varies in the same manner as the different parts of the brain. Sometimes they are of a dull or opaque, white, or yellowish color, like the medullary or fibrous part of that organ; at others, they are grayish, or dusky and reddish like the cortical or pulpy portion, at others, again, they are pinkish like the corpus rhomboideum or crenatum, and finally, portions of them are occasionally very dark, or even black, like the *locus niger crurum cerebri*. But these differences in color have no connection with any discoverable peculiarity of organization, except in so far as vascularity or a staining with more or less altered hæmatin may be concerned. If any quantity of blood has

been for a long time extravasated within any portion of the tumor, it may undergo an alteration in the same manner as we have explained under the head of fibrous tumors, and become converted into a substance like coffee grounds, or greenish bile.

The encephaloid matter is sometimes collected in cysts, generally of moderate, or even of small size (cystic sarcoma of Abernethy), but more frequently it is unencysted, and irregular in shape, as well as undetermined in size. In this latter condition, it frequently grows to an enormous size, displacing the parts, until it reaches the surface, and distends the integument finally to ulceration or bursting. There is another form in which this morbid matter is occasionally deposited, and which was correctly described by Laennec under the name of *infiltrated encephaloid*. This is, however, rarely met with by itself; it is generally found in company with large unencysted or amorphous masses, extending diffusively around it, and penetrating, as it were, by an infiltration between the plates of fascia, or the fibres of the muscles. Sometimes large masses of the muscles become infiltrated in this way, by encephaloid matter beyond the periphery of malignant osteo-sarcomata; and we, therefore, are called upon to allow an extensive latitude between our place of operating, and the external verge of the tumor.

When these growths begin deeply among the soft parts, they generally feel soft and doughy or spongy. If they are bound down tensely below a strong fascia, they often feel like an elastic substance tied in a bag. When they commence near the surface, they present a deceptive feeling of undulation or fluctuation, which may lead to the mistaking of them for old abscesses. The subcutaneous veins, however, over these tumors, generally become enlarged or varicose, and extend in various directions beyond the periphery of the swelling, so as to prevent any experienced practitioner from confounding the different diseases. As it is very important to make a correct diagnosis in such cases, the surgeon should always cultivate the *tactus eruditus*, and learn how to discriminate between the sense of real fluctuation, and a mere tremulous oscillation among the particles of a soft, fleshy substance. Opening these tumors, by mistake, for abscesses, often proves exceedingly exasperating to their progress, and hastens their fatal termination. The appearance and feeling of the skin over these different swellings, especially just before it appears ready to give way to the subjacent distension, will always serve to aid our diagnosis of each individual case. In

abscesses the skin becomes red and erythematous, with a puffy œdema of the subcutaneous cellular tissue between it and the collection of matter, whereas in the spongy tumors, it almost always becomes tense and shining with a dusky or mahogany hue, and a varicose state of the veins around.

One of the distinguishing traits of this disease is, the fact that it almost always occurs in the young, while carcinoma is almost exclusively confined to those who are advanced beyond the adult period of life. Many more cases of medullary cancer, however, occur among the aged, than of true scirrhus among the young. We very rarely meet with the latter in patients under forty or forty-five, whereas, it is by no means uncommon to detect the former at as late a period of life.

Although the conglomerate glands, as the mamma and testis, and the eyeballs of children, are said to be the most common seat of the disease, it frequently occurs in the conglobate glands or ganglia, and perhaps more frequently than anywhere else in the fibrous tissues. The fascia, the periosteum, the perichondria, the tendons, and ligaments, and the common cellular substance of all the parts, give origin to it. Indeed, it is a disease restricted to no one tissue or part within the living body. Perhaps it is of more general prevalence, and occupies a greater diversity of structures than any other local disease. It also extends during its progress through a greater variety of parts than any other, and involves with itself, in one common mass of morbid organization, the most dissimilar fabrics of life. These traits, together with its irrepressible character under every possible mode of general as well as local treatment, and its sure tendency to a fatal result, constitute its universally admitted and dreaded malignity. No other disease brings with its name such terrors to the mind both of the practitioner and patient.

On a minute examination of the substance of medullary growths, their composition appears to differ from that of scirrhous cancers chiefly in the great predominance of their transitory or morbidly developed cells over the fibrous and other elementary textures which constitute the matrix (stroma) of the tumor. In carcinomas, the fibrous tissue predominates, and gives the solidity and firmness to the whole mass. The morbid or cancer cells never tend to develop organized fabrics, but always to disintegration and softening down of the tumor. Their great predominance in encephaloid, therefore, gives the character of brain-like softness and yielding which is the

real distinguishing circumstance between them and scirrhus. As the nutritious or supplying vessels are subjected to a less degree of

Fig. 13.

Encephaloid (from the liver) under the microscope, appeared wholly composed of cells, which showed distinct nuclei and nucleoli. The cells were mostly roundish or oval, but some were caudate. Acetic acid rendered them full, and brought the nuclei plainly in view, (*a*). Here and there some nuclei were seen in an amorphous cytoblastema (*b*). 220 diameters.—(Vogel.)

compression from the softer stroma (parent tissue of the tumor), they are always more vascular than fibrous masses. Indeed, in very soft encephaloids, the vessels dilate so much, and anastomose so freely as to render the whole substance sanguineous in its appearance, and often to convert it into the hæmatoid variety denominated *fungus hæmatodes*. There is a considerable diversity, however, in these respects in different cases. Sometimes there is a very low degree of vascularity in consequence of a greater development of the fibrous matrix or stroma, and then the tumor approaches closely to the nature of a true scirrhus. When the morbid substance is deposited in separate fibrous or cellular capsules so as to resemble the pancreas, it is called *pancreatic sarcoma*. At other times, in consequence of the almost entire absence of the fibrous texture, and the early softening down and disintegration of the cancer cells, the mass resembles the substance of collonemas or gelatiniform cancers. The granular pigment cells (the black pigment), may also enter into the composition of such tumors, and constitute the melanotic form of soft cancer.

Although the cells and corpuscles of encephaloids belong to the same class of transitory or effete molecules which have been described under the head of cancer, still there is some difference in the respective proportions of the various kinds of these cells in the two classes of tumors. The predominating cells of this kind in soft cancer, are the very large parent cells with numerous young

cells or cytoblasts in their interior. They are often as large as the 30th of a line in diameter, and the caudate cells are always irre-

Fig. 14.

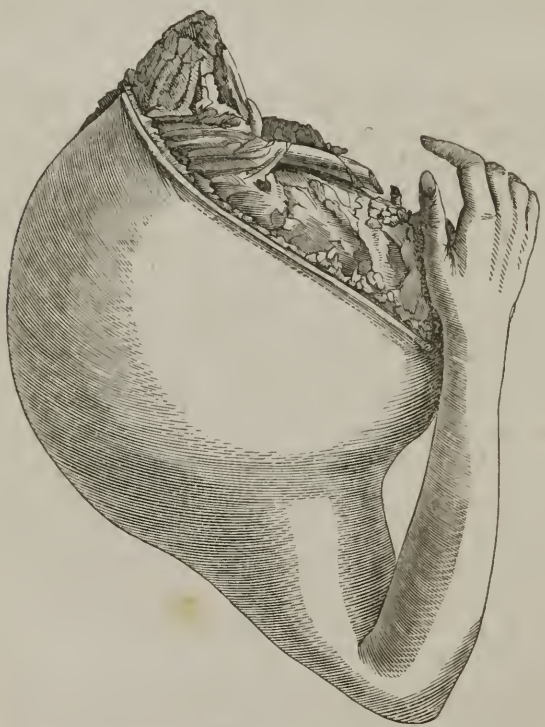
Microscopic appearance of encephaloid, consisting wholly of cells of different size and form—partly round, partly oval, and partly caudate, but no one form predominating over the rest. Some appeared very large (over the 30th of a line), generally enclosing several minute cells with nuclei; *a*, isolated cells, although in a proportionately small number, contained dark granules, *b*. —(Vogel.)

gularly caudate or ramifying. There are hardly ever any of the regular caudate or elongated cells of small size, such as go to the formation of the cellular and fibrous tissue, and of true cancers. The fatty granules and cells are irregularly distributed among these, even more abundantly than in any cases of scirrhus. But the diversity in the proportions and characters of the cells is never so great as to account alone for the difference in the character of the tumors. Sometimes one part of a growth will be a genuine scirrhous formation, while another in close contact with it, and even in the same organ, will be encephaloid. Indeed, they often exhibit transitions into each other; and still more frequently are successively or even simultaneously developed in the same individual subject. On a careful inspection of such cases, it always appears that the histological difference consists chiefly in the existence of a greater or less proportion of fibrous tissue in the form of a stroma, or parent tissue, in the different cases. The character of the cells only comes in for its share in the formation of varieties in the appearance of the deposits.

Genuine medullary cancer, which begins as such, is essentially an acute disease. Almost every case makes rapid and uninterrupted progress from the start, and hurries the unfortunate patient to a speedy exit from his sufferings. The majority live only as many months as those afflicted with scirrho-cancer do years. Oc-

casionally, however, cases will be met with, and especially those which begin in the form of some simple tumor, and are afterwards gradually converted into this species of malignant growth, in which the disease assumes a more chronic character, and by careful management, can be protracted for an almost indefinite period of time. The prognosis of these different forms, particularly in a surgical respect, varies exceedingly; inasmuch as we can never hope to accomplish anything in the way of a radical cure in the first class, whereas there is sometimes good ground for deciding more favorably in the latter, for the interest of our patients. In the former it should always be our first object to render, if possible, the progress of the disease less acute, and to convert it into a more chronic condition.

Fig. 15.*



* [*Fig.* 15 was drawn from a preparation, now in my possession, and represents the tumor for which the author removed the *entire scapula* and *clavicle*.

The operation was performed, April 12th, 1838, at Chestertown, Kent County, Maryland, upon Mr. Thomas Brooks, a young man of about seventeen years

All attempts at eradicating the existing tumor by an operation, while it is rapidly extending, invariably fail of accomplishing the desired object. The disease will inevitably return even before the wound left by the operation has cicatrized, and then the sufferer will be hurried rapidly to the grave without hardly the benefit of a reprieve. The only available plan of treatment, under such circumstances, is by moderate antiphlogistics, by laxatives and a well regulated diet, and by the use of diluents with diaphoretics, to endeavor to diminish the vascular excitement, and thereby arrest the rapidity of progress. Perfect rest in an elevated posture, with evaporating or cooling applications, and the use of moderate compression and occasional topical depletion, will, in some rare cases, procure a respite; and if the functions of digestion and assimilation have, in the meantime, been corrected, it is even possible to superinduce the chronic condition of things, which we have stated to be comparatively

of age. The tumor was of a medullary or encephaloid character, and, as exhibited in the cut, extended from the lower part of the right arm upwards to the shoulder joint, and, projecting both in front and backwards, involved the clavicle and scapula entirely within it. It appeared at the time to be stationary as regards its growth, and the patient, though supporting such an enormous diseased mass, comprising nearly a quarter of his whole body, was otherwise in good health. The operation was commenced by securing the subclavian artery just as it emerged from between the scaleni muscles, and altogether occupied but a few moments. The clavicle was sawn through close to its articulation with the sternum, so as to avoid exposing its articular cavity. Very little blood was lost, and the patient suffered chiefly from constitutional irritation, which, for several days, was very severe and alarming, and was doubtless caused by the shock to the system from the great extent of surface exposed by the operation. Enough sound skin was saved to make a sufficient flap, and the wound healed, and the patient was walking about in a few weeks. He survived the operation over six months, but ultimately died of a return of the disease internally, and in the glands of the neck.

This was certainly, from all the information I can gather on the subject, the first if not the only case in which both the *entire scapula and clavicle* have been removed by a surgical operation. Several cases are reported of their having been torn off by machinery, but no one before the author ever conceived the idea of removing them by amputation. The case of Dr. Mussey, the distinguished Professor of Surgery in Cincinnati, I see quoted as a "secondary operation," and as having been performed for necrosis, by removing the scapula piece by piece at several successive attempts, but of the particulars of the case I have not been able to obtain any account.

Prof. Gilbert, of Pennsylvania Medical College, has since removed, in an operation at which I was present, about one-third of the clavicle and the neck of the scapula, for a tumor involving those parts.—Ed.]

desirable. Exactly as we have pointed out in the consideration of scirrho-cancer, nature appears in some cases to be able to set up a landmark against the further extension of the disease. The morbid efforts appear then to have contented themselves, and the disease may appear to remain dormant for a considerable length of time. Now if we can seize such an emergency, and perform a justifiable operation, it is possible, in this class of cases, as well as in those which were originally chronic from the start, to rid the patient of his uncomfortable and dangerous companion for the remainder of his life.* The same rules of procedure, however, should always be

* About twelve years ago, I was first called in consultation with Dr. Sansbury to see Mr. ——, a ship carpenter, in Shackamaxon Street, Kensington. He had then been afflicted for about six months with an elastic tumor on the inside of his right thigh, which was first detected on the surface of the adductor muscles just above the point where the femoral vessels pass through the tendons from the fore to the back part of the limb. It had grown rapidly of late, and was associated with an irritable or hectical condition of the system. It was then about the size of a pint bowl, and was covered with large varicose veins, and gave to the fingers the peculiar dough-like and elastic feel of medullary growths. I recommended perfect rest, with the limb elevated on a triangular frame covered with blankets, and evaporating lotions of lead water with moderate bandaging, and the steady use of purgatives. I did not hear of him for some weeks again until he had placed himself under the care of Mr. ——, the cancer doctor of Frankford. In about six months afterwards, I was called in again to witness the effects of unsuccessful quackery, as well as those of the progress of the disease. Caustic ointment had been applied for many days in succession over the whole surface, and had caused an ulceration, and finally, an entire destruction of the skin. A monstrous fungous mass protruded, of the size of a half-grown child's head, and incessantly discharged a foul and bloody sanies. He had become exceedingly wan and emaciated; and every sort of tonic and stimulant had been tried in vain by his family physician. As they all assured me the disease had been stationary for more than a month, and as it appeared impossible that he could much longer survive under that condition, I acceded to his urgent request, and performed the operation of extirpating the enormous mass. It proved to have its origin from the partition fascia that is reflected from the *fascia lata* between the vastus internus and adductor muscles, down to the *linea aspera*, and involved several large vessels, as they were given off from the femoral artery, and the perforating branches of the profunda. I succeeded, however, in avoiding the main artery and vein, and got away the whole mass entire, leaving a frightful cavity exposed. To my great joy, I found no appearance of infiltrating morbid deposit among the neighboring muscles and fascia, although this tumor was wholly composed of a medullary deposit, partly softened down in a tolerably dense cellular texture. The patient rapidly recovered after this operation, and in a few months gained sufficient strength to walk out in the streets. Finally, he was able to resume his laborious occupation, and

regarded as we have laid down under the head of operations for the removal of scirrhus. We must be able to extirpate the *whole of the existing disease by a single operation*, or it will be useless to make the attempt. The system must be free from any such constitutional derangement, or internal development of organic disease, as contra-indicates an operation upon hard cancer. As all cases of malignant osteo-sarcoma belong to the same category of diseases, being nothing in fact but medullary cancer of the bones, all that we have said under that head may well be considered as applicable here. In the same way we may hope, in a large proportion of the chronic forms of encephaloid in and among the soft parts, to relieve our patients permanently,* by an efficient operation, although not performed

continued perfectly well without any return of the disease, until the past six months, when he began to be troubled with a small flat tumor on the left side of his nose. He is now under the care of my son, who is treating this tumor with caustic potass, followed by slippery elm poultices. It is a genuine lupus of the malignant kind, and had an elevated oval border with a depressed centre, and was composed of a granular friable substance.

Mr. D—— Y——, the innkeeper, at the sign of the King of Prussia, on the old Lancaster road, was under my care about seven years ago, in consultation with Dr. Van Hoy and Dr. James Anderson, for a precisely similar tumor on the outside of the rectus muscle of his thigh, which had, however, been slower in its development. It had been growing there for several years, and was at first mistaken by an eminent physician for a simple wen. Finally, it had arrived at the size of a pint bowl, and Dr. Van Hoy had punctured it with his lancet under the idea that it contained matter. Nothing but bloody ichor, however, issued out, and the tumor shot out a fungus soon afterwards. I was sent for to amputate, but found a large mass of the iliac gland enlarged, and his system in too febrile a condition to undergo such an operation. After a few days delay under styptic and cold applications, I applied large quantities of powdered lunar caustic to the sloughy orifice in the surface, and followed it by powdered galls. Afterwards, by the repeated application of caustic potass and the galls, I reduced the size of the tumor very greatly, and checked the discharge, until finally I got the febrile symptoms down and dissected out the remains of the tumor. It grew from the partition fascia, which extended down from the fascia lata between the vastus externus and biceps muscle, to the *linea aspera*, all of the exposed surface of which I dissected away. The wound healed up, and the glands in the groin slowly subsided. He continued perfectly well for the past six years. Now, however, a suspicious tumor is just beginning to appear in the neck outside his sterno-mastoideus, on the right side.

* The case of the late Mrs. P——, of Beaufort, South Carolina, was the most remarkable and unexpectedly gratifying one I have ever met with. She was afflicted with a large fungoid and bleeding tumor on the outside of her right mamma, just over the lower edge of the pectoralis major muscle. It had been at

as in most of those cases, at the expense of a limb. Even after our unsuccessful attempts, when the disease finally returns, the patient will be gratified with a conviction that every practicable effort has been made for his relief, and with the certainty that he has enjoyed something good in the form of a reprieve, together with the hope of a better fate. The opinion of some of the most experienced surgeons has been that when the disease has returned after the performance of an operation, there is always less suffering from the local as well as constitutional irritation, than in those cases which are left to the unresisted progress of the malady. Perhaps the free division and even extirpation of all the sensitive nerves around the original location of the disease, and the gradual decline of the con-

first rapidly developed until it arrived at the size of a large quart bowl. The integument then gave way by a cracking over the centre, and incessant oozing of offensive sanies, and, occasionally, a considerable hemorrhage continued ever after, notwithstanding the regular use of styptics and uniform pressure. The disease had remained stationary when she got to this city, for about three months, and she had recovered some flesh and strength on her journey. I finally, therefore, agreed to submit to the decision of her near relative, the venerable Dr. Screven of Pocataligo, who accompanied her, and urgently demanded a trial of surgery in her case. On the 3d of March, 1835, I extirpated the whole mass, including the mamma, which was chiefly involved, along with a large portion of the lower edge of the pectoral muscle, with which the tumor was incorporated. There was a prodigious hemorrhage, and more than twenty enlarged arterial branches of the superior and inferior thoracic and intercostal arteries had to be secured. As there appeared to be a good deal of brain-like, grayish infiltrating matter among the exposed fibres of the pectoralis major, I was afterwards obliged to dissect a good deal more of the substance of that muscle away, before I could expose a perfectly healthy surface. The tumor weighed four and a half pounds, and was composed chiefly of grayish and red or pinky medullary matter intermixed with fibrous and cellular substance. A soft, and friable fungus had protruded through the ruptured and rugged orifice in the skin, and was the source of the preceding hemorrhage and sanious discharge. Hundreds of good pathological anatomists have since explained the preparation, and nobody doubts that it is a genuine malignant medullary cancer. Indeed, the late Professor Wagner and Dr. Simon both described it as such on their first inspection of it during life, and before the integuments had given way. Mrs. P—— recovered after a long struggle, with a copious suppuration and consequent exhaustion, and lived more than eleven years after the operation, without any return of the disease. She was occasionally, however, affected with gouty or neuralgic pains in her breast, alternating with eruptions of furunculi, for which she repeatedly visited the Sulphur Springs of Virginia. Finally she had the senile gangrene in three of her toes, and died under the influence of that disease, last fall in Beaufort.

stitutional forces, during and after the reproduction of the morbid growth, may tend to reduce the disposition to reaction and irritation.

The tendency to pulmonary consumption is not so evident after operations for the removal of medullary cancer of the soft parts, as when the disease has been located in the bones. But, nevertheless, such a consequence does occasionally, perhaps often, occur,*

* I recollect the case of Joseph W. Bateman, a house carpenter, aged 26 years, of Cedarville, N. Jersey, in relation to this point. He came to the city in a stage coach, in the month of Dec. 1842, with an enormous medullary tumor on the back part of his left thigh. It had been only about ten months in progress, and had filled up the whole space between the hamstring muscles and tendons, and extended from just above the flexure of the knee to the tuberosity of the ischium. It had got injured by the stage jolting, and increased rapidly with excruciating pains after his arrival. He soon became bed-ridden, and begged earnestly to have an operation performed, if it could only afford him a chance to return home, afterwards to die with his family. As soon as I could appease the vascular and excessive nervous irritation, I commenced the operation in presence of Dr. S. Jackson, formerly of Northumberland, my son Dr. J. H. B. McClellan, and others. After I had made a long incision along the whole of the posterior surface of the tumor, which extended almost the whole length of the thigh, I attempted to dissect away the vessels which were distended around each side of the tumor, but met with such a prodigious hemorrhage from the perforating arteries, greatly enlarged as they supplied the tumor from its inner surface, that I was obliged to turn over the patient and cut down for the femoral artery at Poupart's ligament. I applied a ligature just above the profunda, and after closing the incision, I replaced the patient on his face, and resumed the original operation. The tumor was then easily got out, although it grew from the whole length of the posterior attachment of the partition fascia of the muscles to the linea aspera, and exposed almost the whole of the posterior aspect of the femur. Several large arteries, which bled from anastomoses with the obturator and ischiatic, had also to be tied notwithstanding the ligature from the main trunk. We had a great deal of trouble in restoring the collateral circulation, and in maintaining reaction from the terrible shock which followed the operation; but he finally recovered, and went home apparently well. The tumor was chiefly medullary, with some fibrous or firm portions intermixed with the mass, so as to give it almost the consistence of a fibrous tumor. A year from the ensuing May, or sixteen months from the operation, he fell into a rapid decline, and died of what his physicians called a galloping consumption, following a hemorrhage from the lungs. No examination was made of the body, but I have no doubt the disease was reproduced in the thorax as a secondary development.

Afterwards, in the ensuing July, 1843, I removed just such another medullary and fibrous tumor, from the son (then 10 years old) of Mr. J. E. Cole, near Haddonfield, N. J., for my friend Dr. Charles Hendry there. The tumor grew from the lower part of the linea aspera, or rather from the attachment of the fascia to it, without involving the bone, and extended inwards underneath the artorius and gracilis, and in front of the semi-tendinous and semi-membra

and we should always direct careful attention to the precautionary treatment. Not only external warmth, and well regulated diet, with free exercise out of doors, should be resorted to, but also external irritation, especially by a discharging issue from some part of the surface. Every symptom like cough or irregular respiration should at once be attended to, and the condition of the digestive organs and primæ viæ should always be regulated. The use of mercurial alteratives, and the preparations of iodine with sarsaparilla, is generally depended on by the profession in this country, but they should never be continued so long after recovery from the operation as to impair the appetite, or create any degree of constitutional debility. Chalybeates in combination with laxatives are, in general, by far the best prophylactics against a return of the morbid deposit, either internally or externally, because they not only improve the digestion, but also enable the patient to take active exercise out of doors in almost every condition of the atmosphere.

Melanosis, or Black Cancer. Carcinoma Melanodes.

We have already described the three different causes of black discoloration of morbid structures, and of disordered conditions even of the healthy organs. The first is the result of the changed hæmatin of the red globules from a chemical reaction of animal acids, the second the effects of sulphuretted hydrogen or hydro-sulphuret of ammonia upon the chalybeated ingredients of the blood, and the third the presence of the granular pigment cells which naturally exist in the choroid of the eye, and in the rete mucosum, and in the hair of all the colored races. It is not exactly determined how far the latter cause of black discoloration is modified to produce the melanotic appearance of morbid growths, but it is

muscles. I succeeded in avoiding the popliteal vessels which ran alone around the posterior surface of the tumor, and got the whole mass away, after securing its supplying arteries. The frightful cavity healed up slowly, inasmuch as a bad and sanious suppuration followed. The disease threatened a return in the upper part of the cicatrix after his recovery from the epidemic dysentery which prevailed that season, but he sunk under cough and chronic diarrhœa in about six months after the operation. There was some discolored pulpy matter found among the intermuscular spaces on the upper portion of the wound, which was probably infiltrated medullary substance, all of which I endeavored to dissect away before closing the cavity. This would undoubtedly have reproduced the disease in all its horrors, had he survived for a longer period.

universally admitted that pigment cells, surrounded by a distinct cell-wall, and containing very fine black pigment molecules or granules, constitute the real essence of melanosis. As they frequently occur out of place in the eyes and skin of horses and the ox-tribe, as well as in some other animals, without producing any morbid effects, and especially as black spots and stains on the surface in the human race, are occasionally met with independent of any derangement of function or other difficulty, it has been supposed that these pigment cells never produce of themselves any malignant influence. Even Vogel asserts that they only become malignant in consequence of being associated with the real malignant deposits. According to him, portions of scirrhous tumors may be black, and whole masses of encephaloids may be discolored from the same cause, without being modified in any other respect than in their color. But this is certainly too sweeping a conclusion. It is generalizing altogether beyond the extent of our experience. Cases of simple melanotic deposit do occasionally occur in the interior, and sometimes even in the vital organs, which go on to produce extensive disorganization, and finally death.* We not unfrequently meet with them on the surface in the tegumentary and sub-tegumentary tissues, which extend so far as to break open their outer coverings, to fungate, create ichorous or dark bloody discharges, and finally to

* Mr. Robertson, of the celebrated old firm of McClure and Robertson, died under my care, in 1822, in this city, with an extreme marasmus, attended with abominably fetid exhalations from his lungs, and expectoration of black offensive mucus, and chronic cough. Dr. Hartshorne saw him with me a few times before the fatal termination, and if I recollect rightly, at the post-mortem examination, which justified my original diagnosis. I had pronounced the case to be a melanosis of the lungs, from the odor and characteristic expectoration, and the appearances all corroborated this conclusion. A large portion of the substance of the left lung was softened down into a partial black puriform or thick inky pulp, and a considerable mass near the root of the right lung was composed of a perfectly black brain-like structure, not fully softened or disorganized. It was altogether different from the common hard carbonaceous degeneration of the bronchial glands, and would have been pronounced by every pathological anatomist a genuine melanosis. Since then I have met with two other fatal cases, of the same kind; and repeatedly I have found the secondary development of this disease after death from external manifestations in the glands and skin. I have already mentioned the case of W. Sorber, who died from marasmus and remittent fever, a long period after the extirpation of his melanotic parotid gland, and in whose pancreas and upper mesenteric glands, I found the genuine disease beginning to return.

multiply themselves to a destructive result like the other morbid growths. Although all such cases appear to be closely allied to encephaloid deposits, and obey the laws of that class of diseases in general, it is impossible to conclude that they deserve no separate consideration in our analysis of organic diseases. They rarely increase or enlarge into such masses as the common forms of encephaloid, especially when developed externally, but they return even more frequently after complete extirpation,* and more extensively

* In the case of the late Mr. T——, the stove manufacturer at the corner of Vine and Second Streets, several small blue tubercles began to form in the skin over the digestive region, of the size and appearance of small shot. These became exquisitely tender and painful under pressure, like the common subcutaneous tubercles or neurilemma, and gradually enlarged until they burst open the cuticle, and shot out a ragged bulbous excrescence of a soft fungoid character, which incessantly discharged an offensive sanies. Some of these became perfectly black before they ulcerated, and afterwards presented the genuine form of fungus hæmatodes. I attempted to extirpate these tubercles as fast as they burst open, but they only broke out the faster in consequence, and extended over the larger space. By the time I had extirpated a few successive returns of the first of these, they had appeared in great numbers, and extended over almost the whole abdomen, and fore part of the chest. There was no difficulty in effecting a cicatrization after each operation, but other similar tumors would be sure to break out all around the margin underneath the neighboring skin. In the course of about a year, he became very weak, wan and emaciated, and his legs appeared œdematous. He repeatedly also coughed up blood, and discharged a melanotic mucous or muco-purulent matter from his bowels. On paying a visit to his friends somewhere in Berks county, he died there beyond my reach, so that I could have no opportunity of making a post-mortem examination.

About eight years ago, a somewhat similar case occurred to me in the house of the late Mr. C——, a tanner and currier from Wilmington in Delaware. He first applied to me for a soft inky black and flat spot of the size of a five cent piece, in the skin of one of his temples, about two inches above the ear. I extirpated it with a sharp bistoury, and afterwards applied the lunar caustic thoroughly so as to remove every vestige of the discoloration, and the wound speedily healed. In about six months more, however, he returned with a row of small black tubercles under the skin, or rather deeply seated in the skin of the temporal and mastoid region, running like a string of beads down behind the ear. I immediately extirpated these by making a long incision down behind the ear, and treated the wound also by caustic. Cicatrization again took place without any difficulty. But in a few months more, another black spot occurred in the upper lip. I treated that as the others, but soon after numerous others broke out in the cheeks, chin, and forehead and eyelids. As these continued to increase in size as well as in number, I had several of my medical friends in consultation, and we tried almost every conceivable plan of alterative and

also in other and remote parts, and they also occur secondarily among the internal organs of the body. The powers of the constitution also sink in the same manner under their depressing or malignant influence, and they certainly, therefore, deserve a place in our category of malignant deposits.

As the pigment granules and cells of true melanosis can be more easily detected by the microscope in the circulation, than either of the other forms of transitory cells of the cancerous element, it is to be hoped that future investigations may be made to do something in the way of elucidating the mode of contamination with all heterologous formations. If the parasite theory of some authors in relation to the independent organism of this class of diseases, were true, we could not only inoculate patients with the different forms of cancer, but we should always detect the cancer cells floating in the circulation, or lodged in the small capillaries. If the experiments of

constitutional as well as local treatment. Although the small wounds made by each operation readily healed up, we could make no check upon the disposition to reproduce the disease in other parts. Finally, the poor fellow got tired of us all, and went to a steam doctor who gave him lobelia emetics, and a plenty of No. 6. He fell into a general dropsy soon after, and died in Wilmington without having undergone an autopsy from any physician.

Another young man, the coachman of one of my friends, came to me with a black excrescence from the caruncula lachrymalis of one eye. I easily removed it with a hook and curved scissors. A black and fungoid thickening of portions of the conjunctiva over the sclerotic coat of the same eye, repeatedly formed again after repeated extirpations under my hands, until he went to New York city, to attend some small grocery there. In about a year, he returned to me with an incipient black fungus sprouting out from the socket. The melanotic eyeball had, in the mean time, been extirpated by a surgeon in New York, and the fungus had shortly afterwards appeared in its place. I did not think it proper to operate again, and allowed him to go to the country for the benefit of fresh air. I never saw him again, but heard of his death in a few months afterwards.

Mrs. H—— H——, of Delaware county, had, some years ago, a small black and painful tubercle on the back of one of her hands. I extirpated it with perfect success. But in about two years, she returned with a similar, although not quite so dark a one, on the dorsum of the other hand. I extirpated it also with the same success. But in about another year, she returned with a very painful blue one on the upper surface of her tongue, about an inch and a half behind the apex. On extirpating that, I probably touched or punctured a branch of the fifth pair of nerves, for she was, for a long time after the cicatrization of the wound, troubled with a distressing neuralgia of the organ shooting through the cicatrix. I cured the neuralgia afterwards by arsenic and occasional doses of belladonna.

Langenbeck were correctly stated, and inoculation of dogs with cancerous matter taken from human subjects, was ever really performed with success, so that the disease broke out in remote parts of the body from the point inoculated, certainly the microscope should be made available in the affair. But there is as yet too much reason to entertain doubts in regard to all such statements. Dupuytren and Valentin, and Day, all failed in their attempts (and some of them were very carefully conducted) to propagate cancers by inoculation. The very phenomena, moreover, which are presented in the secondary developments of this class of disease among remote organs, go to disprove the theory of contagion. There is nothing peculiar or specific in the nature or character of the amorphous blastemata, or in the fibres and bands which constitute the stroma (matrix) of most cancers; nevertheless, these are frequently found in the internal organs in considerable masses, before any cancer cells have been transported to them, and they almost always predominate over the amount of really malignant matter deposited within their interstices. There must be some specific tendency, or predisposition, therefore, to the secondary formation of cancers in the part of the solids and fibrinous portion of the blood, independent of all direct contamination from contact with the cancer cells. It would be idle to suppose that cancer cells are transmitted from one body to another, in the ordinary cases of the development of the disease. They must be spontaneously generated, at least in by far the greater proportion of all the constitutions in which they occur, and the strongest reasons, therefore, exist for concluding that every repeated growth is developed independently in each part, when it occurs from a peculiarity of constitution alone.

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THE END.

ERRATA.*

PAGE 32, 9th line from top, for "*or*," read "*so as not to.*"
—— 37, 3d line from bottom, for "intestines," read "interstiees."
—— 42, 14th line from top, for "neurobathlical," read "neuropathical."
—— 47, 16th and 17th lines from top, for "proportion," read "proposition."
—— 49, 11th line from top, for "he," read "we."
—— 77, 7th line from top, for "from," read "for."
—— 106, 2d line from bottom of note, for "for," read "from."
—— 114, 16th line from top, for "glairing," read "glairy."
—— 124, 5th line from top of note, for "as," read "for."
—— 160, 17th line from bottom, for "deviate," read "abstract."
—— 161, 4th line from bottom, after "course," omit the whole sentenee.
—— 171, 4th line from top, for "separation," read "reparation."
—— 174, last line, for "preventing," read "presenting."
—— 178, 2d line from bottom, for "out of it by," read "out of it as if by."
—— 227, 2d line from top of note, for "oecasionally express it," read "he oecasionally expressed it."
—— 234, 12th line from bottom, for "Phlyzaeiom," read "Phlyzaeion."
—— 240, 18th line from top of note, for "affusion," read "effusion."
—— 240, 17th line from bottom, for "from the souree," read "from the same souree."
—— 242, 9th line from bottom, for "why in large uleers," read "why large uleers."
—— 250, 14th line from bottom, for "glands," read "glans."
—— 251, 20th line from bottom, for "syphilitus," read "syphilis."
—— 266, 11th line from bottom, for "copavia," read "copaiba."
—— 267, 12th line from bottom of note, for "eontinued," read "believed."
—— 274, 5th line from top, for "but," read "lest."
—— 279, 9th line from top, for "hypopon," read "hypopyon."
—— 300, 8th line from top, for "alternative," read "alterative."
—— 308, 2d line from top, for "ran," read "run."

* See the Editor's Preface.

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